## XLVI.—*Some new African Spiders.*
## By R. I. Pocock.

### Fam. **Aviculariidæ.**

### Genus Scodra, Becker.

### *Scodra Batesii*, sp. n.

♂.—*Colour* of the upper and underside of cephalothorax and abdomen and of underside of legs and palpi like that of *S. brachypoda* and *griseipes*, there being a large blackish patch at the distal end of the femur, two, divided by the converging white stripes, on the patella, a single undivided median stripe on the proximal half of the tibia, one on the protarsus and on the tarsus, all these spots being of equal intensity, whereas in *S. brachypoda* and *griseipes* the protarsal and tarsal spots are much deeper than the others.

*Carapace* slightly longer than femur of first, slightly shorter than that of fourth leg, as long as patella + $\frac{3}{4}$ the tibia of the palp, also as tibia + tarsus of palp; slightly longer than tibia, slightly shorter than protarsus of fourth leg; as long as tibia + $\frac{1}{2}$ patella or as protarsus + $\frac{1}{2}$ tarsus of first.

*Legs* 4, 1, 2, 3, fourth exceeding first by more than the length of its tarsus, the fourth four times as long as the carapace, the first less than three and a half times as long; protarsus of first with its upper surface level, as in *S. brachypoda*, not depressed in its basal half, as in *S. griseipes*, but furnished below at its proximal end with a tuft of long silky hairs, as in *S. griseipes*, arising from a basal rounded tubercular excrescence, somewhat as in *S. griseipes*, except that in the latter the inferior excrescence or swelling corresponds to the superior depression.

*Palpus* long, slightly surpassing the tibia of the first leg and exceeding twice the length of the carapace by its tarsus; palpal spine lightly concavo-convex, as in *S. brachypoda*, but a little stouter, blunter, and separated from the bulb at the base posteriorly by a distinct notch, much like that of *S. griseipes*.

*Measurements in millimetres.*—Total length 31; carapace 14; palpus 31; first leg 49, second 48, third 44, fourth 56 (all from base of femur); patella + tibia of first 17·5, of fourth 20; protarsus + tarsus of first 18, of fourth 22.

*Loc.* Efalen, 1500–1800 feet alt., 70 miles from the Congo coast (*G. L. Bates*).

The males of *S. calceata* and *S. fumigata* are unknown to me; but the type of this new species differs from the females, and no doubt also from the males, of these two forms at least in the coloration of the underside of the anterior legs and palpi. The points in which it differs from the males of the other known species may be summarized as follows:—

*a* First leg long, longer than the fourth, nearly four times as long as the carapace ($14\frac{1}{2}:55$), its femur slightly longer than carapace, its patella+tibia longer than, and protarsus+tarsus about equal to, those of fourth; palpus scarcely surpassing its middle; (protarsus of first sinuous, with inferior silky tuft of hairs) ........ *griseipes.*

*b.* First leg short, shorter than fourth, less than three and a half times as long as carapace, which slightly exceeds its femur; its patella+tibia and protarsus+tarsus less than those of fourth; palpus considerably surpassing its middle.

  $a^1$. Legs strongly spotted; palpus long, slightly surpassing tibia of first leg, its patella+tibia considerably longer than carapace, which equals its tibia+tarsus; fourth leg four times as long as carapace, which is equal to its tibia and less than its protarsus; protarsus of first with basal inferior tuft of silky hairs and tubercular excrescence ........ *Batesii.*

  $b^1$. Legs weakly spotted except on protarsus and tarsus; palpus short, falling short of tip of tibia of first leg, its patella+tibia equal to its tibia+tarsus, much shorter than carapace; fourth leg much less than four times as long as carapace, which exceeds its protarsus; protarsus of first without inferior proximal silky tuft and tubercular excrescence ............ *brachypoda.*

## Genus HARPACTIRA, Auss.

### *Harpactira Hamiltoni*, sp. n.

♂.—*Colour* greyish mouse-brown, with silky golden lustre; carapace black, clothed with golden-yellow hairs, showing a definite radial arrangement; sternum and coxæ blackish; hairs on underside of femora foxy red.

*Carapace* a little shorter than patella+tibia of first leg, equal to those of fourth.

Tibial apophysis of first *leg* not straight, but somewhat strongly bent or geniculate, its basal half on the outer side showing a deep notch; protarsus of first leg with its outer surface convex, its inner surface concave, armed distally below with a high tuberculiform prominence. Spine of palpal organ stouter and more strongly curved than that of *H. tigrina* and *curator*.

On the external side of the *mandible* the inferior row of stridulating-spines forms a single series close to the oral fringe.

*Measurements in millimetres.*—Total length 26; carapace 13; palpus 20; first leg 40, second 36, third 31, fourth 42; protarsus + tarsus of first 14, of fourth 17.

A female referred to this species gives the following measurements:—Total length 33; carapace 15·5; palpus 23; first leg 36, second 32, third 29, fourth 39; patella + tibia of first 14, of fourth 13; tarsus + protarsus of first 10·5, of fourth 14·5.

*Loc.* Vredefort Road, Orange River Colony (*Capt. Barrett-Hamilton*).

The male of this new species differs very markedly from that of the other species known to me in the shape of the tibial apophysis of the first leg, the curvature of the protarsus, and the size of its distal tubercle beneath. The female is very like that of *H. gigas*, Poc., from the Transvaal, but is much smaller.

Mr. G. P. Staunton has also recently sent me specimens of *H. Hamiltoni* from Durban.

## Fam. **Dipluridæ.**

### Genus BRACHYTHELISCUS, nov.

Allied to *Brachythele*, Auss., but differing in having the tibia of the first leg simple, armed with strong spines, but without a spur. The tarsus of the palp is short and truncate.

Type *B. bicolor*, Poc. (Proc. Zool. Soc. 1897, p. 735) (*Brachythele*).

The type of this genus was based upon a single mutilated female example collected by Mr. H. A. Spencer at Durban. Being acquainted only with the female, I was not able to separate the species from those of the genus *Brachythele*. The discovery of the male by Mr. G. P. Staunton has, however, shown that the species differs from the typical species of *Brachythele* in the absence of a tibial spur on the first leg in the male.

In both males and females the abdomen is spotted or banded above.

The male has long and slender legs; the protarsus of the first is armed beneath with 1, 1 spines, of the second with 2, 1, 2 spines. The palpi are short, the tibia a little exceeds the patella, is inflated proximally below, and armed with two long external spines beneath and one internal. The bulb of the palpal organ is piriform, passing gradually into the spine, which is lightly curved.

*Measurements in millimetres.*—Total length 10; length of carapace 4·5, of first leg 15, second leg 14, third leg 13, fourth leg 18.

### Genus EUAGRUS, Auss.

### *Euagrus caffer*, sp. n.

♀.—Prevailing colour deep brown; hairy clothing silky yellowish brown; abdomen dark above and speckled with pale spots; legs with a pink dorsal rim on the distal end of the segments.

*Carapace* one fourth longer than wide, as long as patella + tibia of fourth leg and as patella + tibia + ½ the protarsus of the first, a little shorter than protarsus and tarsus of fourth. *Eyes* of anterior line strongly procurved, anterior edge of medians, if anything, behind the posterior edge of the laterals, close together, medians about half their diameter from each other and from the laterals, to which they are subequal in area; posterior laterals as large as anterior laterals and subequal to them. Tibia of first and second *legs* armed with spiniform setæ, with at most a pair of inferior apical spines; protarsi armed with many strong spines; tarsi scarcely spined; tarsus of palp spined; tibiæ of third and fourth furnished with spiniform setæ; protarsi strongly and numerously spined; tarsi with a few spines. Anterior *spinners* separated by a space which exceeds their width; posterior spinners 1½ times as long as carapace, second segment exceeding the first, the third a little shorter than the sum of the other two.

♂.—Smaller than female; *carapace* longer than patella + tibia of first leg and about as long as its protarsus + tarsus. *Palpus* short, scarcely surpassing patella of first leg, its tibia inflated below proximally, longer than the patella, armed on the inner side beneath with three long spiniform setæ; tarsus short, truncate, as in the Aviculariidæ; the palpal organ long, quite as long as the tibia, the bulb oval, piriform, gradually passing into the spine, which is stout and curved basally and very slender, filiform, and straight distally, with a slight apical curve. Tibia of first *leg* strongly spined internally, much thicker than the protarsus, which has 1, 2, 2 spines beneath; tibia of second leg a little inflated internally, armed near the middle of its length on the inner side with a large triangular process, which is itself armed anteriorly with three short, sharp, tooth-like spines; protarsus with a low angular spine-tipped process in the middle of its basal half beneath.

*Measurements in millimetres.*— ♀. Total length 14; carapace 6·5; spinners 9; first leg 13·5, second 13, third 13·5, fourth 14; patella + tibia of first or fourth 5, protarsus + tarsus of first 4·5, of fourth 5·5.

♂. Carapace 4·2; first and second leg 11, third leg 11·5.

*Loc.* Durban (*G. P. Staunton*).

Mr. Staunton is particularly to be congratulated on this capture which adds a new genus to the fauna of Africa. Hitherto *Euagrus* has only been known from species collected in Central America. In general form and habits *Euagrus* resembles *Ischnothele*, of which one species has been recorded from South Africa, namely, *I. mashonica*, from Mashonaland, where it was found by Mr. J. ff. Darling (Ann. & Mag. Nat. Hist. (7) vii. p. 337, 1901). *Ischnothele*, however, has the labium and maxillæ cuspulate, two rows of teeth on the mandibles, and the tibia of the first leg modified in the male.

### Fam. Ctenizidæ.

### Genus STASIMOPUS, Sim.

### *Stasimopus nigellus*, sp. n.

♂.—*Colour* jet-black, with the tarsi and distal end of the protarsi yellowish red; paler brownish beneath, the genital plate and opercula testaceous.

*Carapace* coarsely rugose, as in *S. insculptus*, Poc., from King William's Town, a little longer than tibia of first leg or of palpus, equal to protarsus of fourth.

*Eyes* of anterior line large, subequal, and subequally spaced, less than a diameter apart, scarcely at all procurved, their anterior edges in approximately the same straight line; eyes of posterior line small, subequal, widely separated, but the median nearer the lateral than to the anterior median, its inner edge almost in a line with the middle point between the anterior and lateral eyes of the front row.

*Palpi* long and slender, midway in length between those of *P. palpiger* and *P. insculptus*; the tarsus extending to the middle of the protarsus of the first leg, the patella overlapping that of this appendage and a little longer than it, but only about half as long as its femur, and equal to two thirds the length of the tibia; the trochanter a little longer than that of the first leg.

*Legs* of first and fourth pairs subequal, third subequal to palpus.

*Measurements in millimetres.*—Total length 9; carapace 4; palpus 11; first leg 14·5, second 13, third 10·5, fourth 15.

*Loc.* Vredefort Road, in the Orange River Colony (*Capt. Barrett-Hamilton*).

### Genus MOGGRIDGEA, O. P. Cambr.

### *Moggridgea Stauntoni*, sp. n.

♀.—Easily distinguishable from the rest of the known

South-African species of this genus* by the absence of the patches of spinules on the coxæ of the first, second, and third pairs of legs, by the restriction of the spinules on the labium to the apical half of this sclerite, and of those on the coxa of the palp to three or four irregular rows on the preaxial side of the under surface. Moreover the eyes of the anterior line are either straight by their centres or slightly procurved; the medians being from about one half to three quarters of a diameter apart and from about one and a half to nearly twice their diameter from the laterals, to which they are subequal in size, being sometimes slightly larger and sometimes slightly smaller; the distance between anterior median and anterior lateral about equal to that between anterior median and posterior lateral and much greater than that between the two laterals on each side, which about equals a diameter and a half of the anterior lateral. In *M. Dyeri*, *Abrahami*, and *Whytei* the distance between the two lateral eyes is subequal to the other distances, so that the three eyes in question are disposed as if on the angles of an equilateral triangle.

The spines on the palpi and anterior two pairs of legs are inconstant in number; on the palpi there are usually two (sometimes three) spines on the inner and outer sides of the tibia and tarsus; on the first and second leg there are usually externally 8–9 tibial and 4–5 protarsal spines, while the inner side of each of these segments is usually armed with 4 spines.

*Measurements in millimetres.*—Total length 15; carapace 8; patella + tibia of first leg and fourth leg 7.

*Loc.* Durban (*G. P. Staunton*).

### Genus ACANTHODON, Guér.

### *Acanthodon Hamiltoni*, sp. n.

♀ (subadult).—*Colour* uniformly ochraceous; ocular tubercles black.

Anterior lateral *eyes* looking forwards from the extremities of a pair of large, elongate, abruptly rising tubercles, which are as long as the depression separating these tubercles from the posterior eye-cluster; the four median eyes of the latter forming a quadrangle which is only a little wider behind than it is long; the eyes compact, subequal, the anterior and posterior on each side separated by a narrow space, the anteriors separated from each other by a space of about a diameter, the posteriors by a space which a little exceeds a diameter; posterior lateral eyes very large, each larger than the sum of the adjacent eyes of the median quadrangle, their anterior edges slightly in advance of the anterior edges of the anterior medians, their centres a little in advance of the mid-point between the anterior and posterior medians, their posterior extremities a little in advance of the middle of the posterior medians; distance between posterior medians and posterior laterals about twice that between the posterior medians.

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* For table of these see Pocock, P. Z. S. 1897, p. 734.

*Labium* with a single row of four cusps. *Palpus* with its tibia armed externally beneath with three long spines and about eight short spines above them; tibia of first leg armed in the same place with about six long spines and twenty short spines above them; tibia of second leg with three long setiform spines beneath and only one short spine above; spines on anterior side of patella of fourth leg arranged in two or three rows, not forming a thick cluster of about half a dozen rows, as in *A. flaveolum.*

Total length 10 millim.; carapace 5.

*Loc.* Vredefort Road, Orange River Colony (*Capt. Barrett-Hamilton*).

Differs from the females of the other tropical and South-African species of the genus in the large size of the posterior lateral eyes and in the proximity of the posterior median eyes.

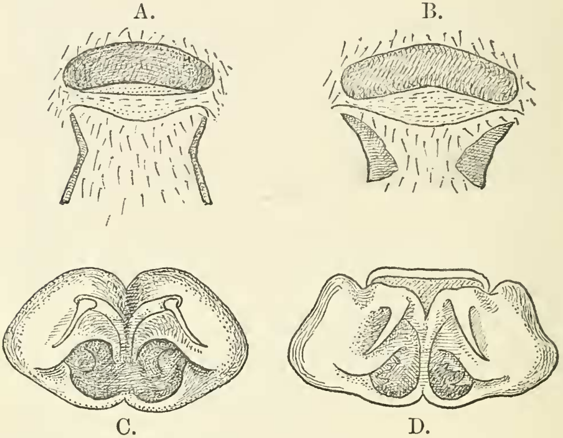
## Fam. **Scytodidæ.**

### Genus SCYTODES, Latr.

### *Scytodes Broomi*, sp. n.

♀.—*Colour.* Carapace ornamented with yellow and black bands of about equal width; an anterior black patch covers the median eyes; from the anterior lateral angles of the clypeus a black stripe extends backwards on each side of the middle line, over the lateral eyes, and stops short just past the middle of the carapace in front of the highest point of the eminence; externally to this stripe arises a second of about equal width, which runs from the antero-lateral margin of the carapace towards the summit of its highest portion, then descends abruptly to its posterior border, almost or quite meeting its fellow of the opposite side; anteriorly it touches the abbreviated admedian stripe a short distance behind the lateral eyes; the external surface of the carapace may be described as covered with a black field relieved by four large pale spots, or as being ornamented with two irregular-shaped black lines united by transverse bars.

*Legs* yellow and black; coxæ black in front, trochanter with an anterior black spot; femora largely blackish in front, with a subapical black band and a more or less defined submedian band; distal end of patella and proximal end of tibia black; a subapical black ring as well as an indistinct median band; mandibles with black patch in front; palpi with femoral and tibial ring; labium with three black spots; sternum with four black patches on each side and a median black stripe; abdomen ornamented above with four rows of black spots; blackish beneath.



A. *Scytodes Broomi*, sp. n. Ventral abdominal sclerites of female.
B. *Scytodes Marshalli*, sp. n. Ventral abdominal sclerites of female.
C. *Cærostris corticosa*, sp. n. Vulva.
D. *Cærostris Darlingi*, sp. n. Vulva.

*Carapace* high, beset with short bristles rising from pores with elevated rims, which impart a sparsely granular appearance to the integument; clypeus lightly emarginate, about as long as the width of the anterior eyes. *Palp* with tarsus about twice as long as tibia and longer than tibia and patella. *Legs* long and slender, carapace shorter than tibia of third.

Horny plates on lower side of *abdomen* consisting of a pair of high crests, which at first run inwards from near the angles of the genital operculum, then turn backwards and slightly outwards at an obtuse angle; the area between these crests is at least as wide as long mesially and wider than long posteriorly, where it nearly equals the width of the genital cleft. (Fig. A, p. 322.)

*Measurements in millimetres.*—Total length 10; carapace 5·5; length of first leg 33, third leg 21.

*Loc.* Garies, in Namaqualand (*Dr. R. Broom*).

### *Scytodes Marshalli*, sp. n.

♀.—*Colour.* Fore part of carapace brownish, with two narrow black lines on each side showing through the brown, the inner passing backwards from the median eyes, the outer from the same point over the lateral eyes; posteriorly the two are more or less confluent with a broad black stripe which extends over the summit of the carapace, is broken up by three or four pale spots, and posteriorly meets its fellow of the opposite side, the two circumscribing a conspicuous cordate yellow patch on the middle of the carapace; laterally the carapace is marbled with black and yellow. On the legs the femora and tibiæ have three black bands, the proximal and submedian tibial band showing a tendency to coalesce, the patella entirely pale above, but spotted in front; sternum black, with symmetrical yellow patches; palpi with a strong and complete distal tibial stripe; abdomen marbled with black laterally and below and in the middle above its anterior and posterior extremity.

*Carapace* high posteriorly, hairy, and with about the same length of clypeus as in the preceding species, as long as the tibia of second leg, a little shorter than that of first, considerably longer than patella + tibia of third.

*Abdomen* with horny plates distinct and bordered externally by a thickened rim or crest, each of which runs obliquely inwards and backwards from near the angles of the genital cleft without any very noticeable curvature. (Fig. B, p. 322.)

*Measurements in millimetres.*—Total length 8; carapace 3·5; first leg 16, its tibia 4·5; tibia of second 3·8; patella + tibia of third 3; third leg 10·5.

*Loc.* Estcourt, Natal, 4000 feet (*G. A. K. Marshall*).

## Fam. **Uloboridæ.**

### Genus DINOPIS, MacLeay.

### *Dinopis Stauntoni*, sp. n.

♀.—*Colour.* Integument uniformly blackish brown and covered with a coating of whitish-yellow hairs, which are particularly thick upon the dorsal side of the carapace and abdomen; the underside of the trunk a little darker than the upper; the underside of the posterior bifid prominence yellowish.

*Carapace* of the same shape apparently as in *D. bubalus*, Sim., with an angular horn over the eyes. Femur of first and second *legs* subequal, the former basally expanded and geniculate on the inner side, to fit against the side of the head. *Abdomen* elongate, with a pair of large tubercles in front of the middle and a bifid posterior extremity.

*Vulva* consisting of a rounded eminence, with convex anterior and straight posterior border, impressed posteriorly with a pair of obliquely diverging pits, separated by a septum, narrow in front and broad behind.

*Measurements in millimetres.*—Total length 25; length of carapace 8, width 5; length of abdomen 18, width 5; second leg 43, third and fourth 22–23; femur of first 15.

*Loc.* Durban (*G. P. Staunton*).

This species certainly differs from *D. bubalus*, Simon, from Kilimanjaro, in the form of the vulva. This organ in *D. bubalus* is described as flat and subquadrate. Moreover, the sternum and legs are described as "luridi."

This new species may prove to be the female of *D. cylindricus*, which was also captured at Durban. If the differences pointed out between the males and females of *Dinopis* in the subjoined table prove to be merely sexual, it seems probable that the synonymy of some of the African species will work out as follows:—

*D. bubo*, Brit. Cap., ♂, = *D. Anchietæ*, Brit. Cap., ♀; from Angola.
*D. cornigera*, Gerst., ♂, = *D. bubalus*, Sim., ♀; from German East Africa.
*D. cylindricus*, Poc., ♂, = *D. Stauntoni*, Poc., ♀; from Natal.

Pending the settlement of this supposition the tropical African species of this genus seem to be separable by the following characters:—

*a.* ♀.—Carapace without white bands; abdomen with a large tubercle on each side near the middle.
  *a*¹. Femur of first leg without anterior basal enlargement (no frontal horns) .......... *aspectans*, Poc.
  *b*¹. Femur of first leg with a large basal enlargement.

$a^2$. Frontal horns absent ................ *ornatus*, sp. n.*
$b^2$. Frontal horns present ................ *Anchietæ*, Brit. Cap., and *bubalus*, Sim.

*b.* ♂.—Carapace with V-shaped cephalic stripe and pale stripe on lateral border; no median abdominal tubercles.
  $a^3$. Femur of first leg less than twice as long as carapace; palpus much shorter than carapace ................................ *cornigera*, Gerst.
  $b^3$. Femur of first leg about three times as long as carapace; palpus longer than carapace.
    $a^4$. Carapace as long as femur of palp ...... *bubo*, Brit. Cap.
    $b^4$. Carapace as long as femur, patella, and tibia of palp ........................ *cylindricus*, Poc.

## Genus MENNEUS, Sim.

### *Menneus camelus*, sp. n.

♀.—*Colour.* Integument yellow, clothed with white hairs; carapace speckled with brown laterally; abdomen variegated with olive-brown stripes and patches, somewhat as in *Cœrostris*; its lower surface marked with two fuscous mesially interrupted bands; sternum infuscate laterally and behind, pale in the middle; labium infuscate distally; maxillæ with a distal fuscous patch; mandible with a fuscous patch in front and some fuscous spots; legs mostly yellow, with black spines; the tarsi and distal end of the protarsi infuscate; upperside of patella and distal end of femur of fourth leg with median black stripe.

* This new species may be diagnosed as follows:—

*Dinopis ornatus*, sp. n.

♀.—Of the same form of carapace and abdomen as *D. Stauntoni*, but without frontal horns, the superciliary ridge of the eyes being evenly rounded.

*Carapace* rather scantily covered mesially with short dark yellowish-brown hairs, brown forming a large triangular patch; many white hairs on the head and on the sides and posterior portion of the thoracic area; upperside of abdomen yellowish, covered with silvery white hair, with a large anterior black patch on each side and a dark patch behind the prominence, a white stripe descending on each side from the dorsal to the ventral surface in front of the prominence; lower surface with a pair of subcentral yellow patches.

*Vulva* convex, not strongly chitinized, furnished posteriorly with a linguiform sclerite, which is narrowed in front, but is for the most part concealed in the epigastric fold, where on each side of it the apertures of the receptacula seminis open.

*Measurements in millimetres.*—Total length 29; carapace 9·5; femur of first leg 19, length of fourth leg 41.

*Loc.* Abyssinia.

*Eyes* of anterior line subequal, the medians about three diameters apart and one diameter from the posterior medians, the latter twice the diameter of the anterior medians and rather more than three diameters apart and a little more than that from the posterior laterals; the median quadrangle twice as wide behind as its anterior width and about as long as its anterior width; distance between anterior lateral and anterior median eye on each side equal to three times the distance between the two medians.

*Abdomen* lightly expanding towards its middle, about twice as long as wide; its upper surface just behind the middle prolonged into a long conical process, which, when distended, is as long as the carapace or at least three quarters the length of the abdomen.

*Vulva* consisting of a simple horny triangular plate, with transverse posterior border, the apertures of the receptacula seminis on its posterior portion within the epigastric fold.

*Mandibles* powerful, armed with four anterior and five posterior teeth.

*Measurements in millimetres.*—Total length 11; carapace 5; height of abdomen 8; length of first leg 33, fourth 16.

*Loc.* Durban (*G. P. Staunton*).

This is the second record of the genus *Menneus* from Africa. The only other species known from this country, *M. tetragnathoides*, Simon (Bull. Soc. Zool. Fr. i. p. 218, 1876), was based upon a male from the Congo, which certainly differs from *M. camelus* in having the anterior median eyes and also the posterior median eyes about a diameter apart. The abdomen, too, is described as narrow, elongate, and parallel-sided.

## Fam. **Argiopidæ.**

### Genus CÆROSTRIS, Thor.

### *Cærostris corticosa*, sp. n.

♀.—Closely resembling *C. sexcuspidata*, Fabr., in colour and general characters, but with the ventral surface of the abdomen dead black, no bitubercular prominence above the spinning-mamillæ, and the fringe on the posterior side of the femur of the fourth leg formed of slender undifferentiated hairs.

*Vulva* very different, the two processes long, slender, submembranous, separated by a space equalling the length of either, the area between them deeply grooved longitudinally; the two fossæ looking obliquely inwards and backwards, with a relatively small thickened sclerite lodged in the infero-external angle. (Fig. C, p. 322.)

Total length 17 millim.

*Loc.* Estcourt, in Natal, 4000 feet (*G. A. K. Marshall*, type); Vryburg, British Bechuanaland; Port Elizabeth (*Dr. R. Broom*); Brak Kloof, Grahamstown (*Mrs. White*); Salisbury, Mashonaland (*G. A. K. Marshall*).

I formerly (Ann. & Mag. Nat. Hist. (7) i. p. 311, 1898) referred this species to *C. Vinsonii*, Thorell, on account of the length and wide separation of the processes of the vulva. Recently, however, I have received from Mr. Quekett an example of *C. nodulosa*, Poc., from Zululand; and since the description of the vulva of *C. Vinsonii* applies more closely to this organ in *C. nodulosa* than in *C. corticosa*, I have been compelled to abandon the old supposition with regard to *C. Vinsonii*, and to give a new name to the form I at one time supposed to be that species.

Thorell's (Eug. Resa, Araneæ, pp. 4–9) contribution to our knowledge of the South-African forms of the genus *Cærostris* may be summarized as follows:—The species Simon, probably rightly, determines as *C. sexcuspidata*, Fabr., Thorell describes as *C. mitralis*, Vins., with two varieties, *humilis* and *turrigera*, based upon the form of the abdomen. As separate species he describes *C. Keyserlingii* and *C. Wahlbergii*, based also apparently upon the form of the abdomen. At all events, since the vulva is said to be alike in the three species, it is probable that they all belong to one and the same form, namely *C. sexcuspidata*. *C. Vinsonii*, on the other hand, is no doubt distinct. The vulva is described as follows:—"Vulva ut in iis [i. e. *mitralis*, *Wahlbergii*, and *Keyserlingii*] transversa, sed foveæ ejus duæ minores sunt, et antice plaga elevata, transversa, cornea, quæ impressione media, postice latiore notatur, est limitata; aculei duo recurvi, basi non uniti, in margine anteriore hujus plagæ longe ante foveas conspiciuntur."

## *Cærostris Darlingi*, sp. n.

♀.—Nearly related to *C. sexcuspidata* and *C. corticosa*, but differing from the latter in that the fringe on the posterior side of the femur consists of expanded, flattened, blade-like hairs.

*Vulva* somewhat like that of *C. corticosa*, but with a distinct transverse sclerite in front of the eminence bearing the stylets; the latter much thicker at the base than in *C. corticosa* and not quite so widely separated; the two foveæ have the same aspect as in *C. corticosa*, each is occupied by an irregular membranous sclerite, and they are separated down the middle line by a strong but narrow longitudinal crest, which anteriorly bifurcates. (Fig. D, p. 322.)

Total length 20 millim.

*Loc.* Enkeldoorn, Mashonaland (*J. ff. Darling*).

The following table, in which a new specific character is used, may facilitate the determination of the tropical African members of this genus represented in the British Museum :—

| | |
|---|---|
| *a*. Femur of fourth leg clothed behind with a brush of unmodified hairs .............. | *corticosa*, sp. n. |
| *b*. Femur of fourth leg clothed behind with a brush of thickened, flattened, or otherwise modified hairs. | |
| $a^1$. Hairs of the brush not all alike, a few at the base of the femur much larger than the rest. | |
| $a^2$. The brush consisting of many long and relatively slender hairs, the larger basal hairs broad and spatulate ...... | *columnifer*, nom. nov.* |
| $b^2$. The brush consisting of many very short and broad closely packed hairs, those at the base of the segment much longer and prone .................. | *nodulosa*, Poc.† |
| $b^1$. Hairs of the brush alike or approximately alike in form, those at the base of the segment not noticeably larger than the rest. | |
| $a^3$. Hairs of the brush serially set, very broad, flat, with edge near the body convex, and slender sharpened apex .. | *albescens*, Poc.‡ |
| $b^3$. Hairs of brush irregularly arranged, close-set, more numerous, and much finer. | |
| $a^4$. No basal white band on underside of tibiæ of second to fourth legs; hairs of femoral brush coarser .... | *femoralis*, Thor.§ |
| $b^4$. A broad white band on the base of all the tibiæ; hairs of brush much finer. | |
| $a^5$. Processes on vulva short, horny, and in contact in the middle line. | *sexcuspidata*, Fabr. |

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* New name for *Cærostris turriger*, Poc. (P. Z. S. 1899, p. 857, pl. lvii. fig. 15), from the Benito River. The name "*turrigera*" was used by Thorell for one of the Caffrarian varieties of the species he described as *C. mitralis*, Vins. ('Eugenies Resa,' Araneæ, pp. 4–6).

† P. Z. S. 1898, p. 514, pl. xli. fig. 7.

‡ P. Z. S. 1899, p. 856, pl. lvii. fig. 16, from the Benito River, Congo.

§ Bih. Sv. Vet.-Akad. Handl. xxv. Afd. iv. no. 1, p. 63, from the Cameruns, Oct. 1900, = *C. argostictus*, Poc. (P. Z. S. 1899, p. 855, pl. lv. fig. 5, May 1901), Benito River. The femora of this species vary in colour from red to steel-blue. M. E. Simon first drew my attention to this synonymy.

$b^5$. Processes on vulva long, slender, submembranous, and widely separated in the middle line ........ *Darlingi*, sp. n.

## ÆTHRISCUS, gen. nov.

Allied to *Æthrodes*, Poc. (P. Z. S. 1899, p. 861, pl. lv. fig. 2), but differing in the following characters:—

*a.* Ocular quadrangle slightly longer than wide, parallel-sided; carapace with a single large tubercle just in front of the fovea; upperside of abdomen with six pairs of tubercles in addition to those on the margin; seven pairs of tubercles along the anterior border, not including the lateral, and nine sigilla along the anterior border, as in *Aranæthra*; anterior lateral angles of abdomen subrectangular, the angular tubercle not larger or more prominent than the rest ............ *Æthrodes.*

*b.* Ocular quadrangle considerably shorter than its anterior width, which much exceeds its posterior width; carapace with one small tubercle on a level with the cephalic constriction; upperside of abdomen with only marginal or submarginal tubercles; eleven sigilla along the anterior border; a very large and prominent anterior lateral tubercle, giving an acutely angular aspect to this region of the abdomen .................... *Æthriscus.*

### *Æthriscus olivaceus*, sp. n.

♀.—*Colour* olive-brown; upperside of abdomen clear olive-yellow, with darker margin.

Upperside of *abdomen* flattish, smooth and shining, with its anterior border straightish, lightly sinuous, the median emargination shallow and furnished with a pair of contiguous tubercles behind the middle third of the anterior border, similar to but less prominent and less scattered than those of *Æthrodes mammosa*, the inner being close to the median sigillum, the outer being separated from the inner by a space impressed with two sigilla; the posterior border of the upper surface bearing a pair of somewhat widely separated submedian tubercles; the anterior lateral tubercle subbifid, projecting downwards and forwards; close to the posterior border immediately behind it there is also a large erect tubercle, exceeding the others of the dorsal surface in size.

*Vulva* exhibiting just in front of and below the generative cleft a pair of widely separated oval apertures to the receptacula seminis; in front of these its surface rises into a triangular process, the free arch of which is produced into a slender forwardly directed scape.

Width of abdomen 15 millim.; median length 7.

*Loc.* Benito River, Congo (*G. L. Bates*).

### Fam. **Heteropodidæ.**

### Genus Selenops, Latr.

### *Selenops Stauntoni*, sp. n.

♀.—Resembling *S. parvulus*, Poc., in size, coloration, and general appearance, but differing in that the tibiæ of the first and second pairs of legs are armed beneath with five pairs of spines; sometimes also there is a small apical spine on the anterior side of the tibia of the first leg. Of the eyes of the median quadrangle the posteriors are considerably larger than the anteriors, with their inferior edges only very slightly higher than the centres of the latter.

*Vulva* large, recalling that of *S. Spenceri*; it may be described as a longitudinally oblong horny plate, with its anterior half marked with a pallid, heart-shaped, membranous area.

Total length 7 millim.; carapace 4.

*Loc.* Durban (*G. P. Staunton*).

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## XLVII.—*Descriptions of Two new Coleoptera of the Family* Buprestidæ. By Chas. O. Waterhouse, F.E.S.

### *Amorphosoma distans*, sp. n.

Elongatum, subparallelum, crassum; capite cupreo, punctulato, in longitudinem profunde sulcato, quadrituberculato; thorace transverso, inæquali, obscure cupreo, tuberculis fusco-cupreis instructo; elytris fere nigris, area basali pube griseo-flava ornata, fascia post medium grisea; corpore subtus obscure cupreo; metasterno abdomineque area basali albo-pubescentibus.

Long. 9 millim.

*Hab.* Waterberg, Transvaal, S. Africa.

The head has four round obtuse tubercles, the two on the vertex much stronger than the others. The thorax is broader than long, obscure coppery, with the raised parts much darker. The anterior part of the disk has six obtuse round tubercles (arranged thus ·∷· ), and at each posterior angle a comma-shaped elevation. Each side has two obtuse angles (with a slight sinuosity between them), so that the general form of the thorax is a transverse hexagon. The elytra are nearly black, with a shade of copper at the base. The basal half is clothed with greyish-white pubescence, which near the suture shows a slight golden lustre in certain lights. There is a transverse black mark close to the base of each elytron, united with a black humeral spot. A very small black spot at the side below the shoulder, and behind this a rather large, somewhat ill-defined, oblong black mark. There are numerous other small black dots. At some distance from the apex there is a moderately broad fascia of whitish pubescence, in which are several small black marks. There is an interrupted ring of whitish pubescence close to the apex. The apex has its margin finely serrate.

This species is in the British Museum and also in Mr. W. L. Distant's collection.

### *Amorphosoma dentifer*, sp. n.

Sat breve, crassum, cupreo-æneo tinctum; capite bituberculato; thorace lato, transverso, inæquali; elytris nigro-variegatis, hic et illic pube brevi ornatis, ante apicem fasciis duabus angulatis albis; singulo elytro ad apicem dento acuto armato et denticulato.

Long. 7 millim.

*Hab.* Waterberg, Transvaal, S. Africa.

Head coppery; the forehead with two slightly diverging conical tubercles, which are tipped with black scales. Thorax strongly transverse, sloping down at the sides, very convex in front, strongly impressed at the base. Obliquely widened for one third its length from the anterior angles, then subparallel (only very slightly narrowing posteriorly), and then obliquely narrowed to the base; the angles thus formed are obtuse; the margins slightly crenulate. On the disk there are four slight elevations, but they are not well defined, and on each side a distinct coppery tubercle. There is a carina extending from the posterior angle to the anterior of the two lateral angles. There is a little silvery pubescence in the basal impression, but it is only visible in certain positions. The elytra are coppery æneous, with various vague blackish marks, the most conspicuous being a rather large mark at the base; several black dots on the suture and on the margins, alternating with silvery white dots (these, however, are not very distinct); a rather broad ill-defined fascia at some distance from the apex. Near the apex there are two zigzag lines of white pubescence, which do not reach the suture. At the apex of each elytron there is a well-marked acute tooth; the sutural angle is slightly dentiform, and at the outer angle there are four minute acute teeth. The underside of the insect is coppery, shining. The sides of the metasternum are clothed with yellowish-white pubescence. On the abdomen there is a little whitish pubescence, which has a tendency to form spots. The apical segment is transverse, truncate, with the angles rounded.

This species is in Mr. W. L. Distant's collection.

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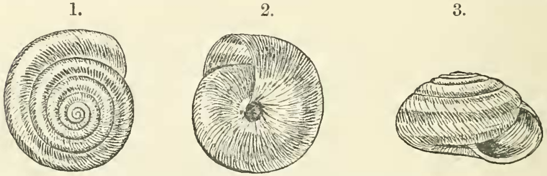
## XLVIII.—*Description of Two new Helicoid Land-Shells.*

By G. K. Gude, F.Z.S.

### *Eulota* (*Euhadra*) *Gereti*, sp. n.

Shell moderately umbilicated, depressed conoid, shining, finely and regularly ribbed, decussated by wavy impressed spiral lines; straw-yellow, with three pale chestnut bands, the upper two of which are rather narrow and well defined. The first borders the suture; the second is just above the periphery, the third below, paler than the other two and gradually fading into the paler umbilical region. Spire depressed, suture rather deep, apex obtuse. Whorls 6¼, increasing slowly and regularly, a little rounded above, somewhat flattened below, and becoming tumid towards the mouth; last whorl not descending in front. Aperture oblique, crescent-shaped; peristome straight, thin, acute, with a thickened rim inside; margins distant; columellar margin a little dilated and slightly reflected over the umbilicus, which is rather narrow but deep, showing all the whorls.



Figs. 1–3.—*Eulota* (*Euhadra*) *Gereti*, sp. n.

Diam. maj. 22·5, min. 21; alt. 15 millim.

*Hab.* Japan. Type in my collection.

A single specimen, labelled *Helix simodæ*, Jay, was received from Mr. P. Geret, of Paris. Upon comparison with the description and figures of the type in Pilsbry's 'Manual of Conchology,' it was at once apparent that the shell could not be referred to that species, but that it was an undescribed form, intermediate between *Eulota luna*, Pils., and *E. Editha*, A. Ad. *E. Gereti*, however, is larger than either of these two species and much more depressed than *E. luna*.

Mr. E. A. Smith kindly showed me two specimens from the Cuming Collection in the British Museum pertaining to *E. Gereti*, which were also labelled *H. simodæ*; they are, however, larger than the type, measuring 28 and 26 millim. respectively. The exact locality is not recorded in either case.

### *Ganesella procera*, sp. n.

Shell narrowly umbilicated, trochoid, thin, solid, corneous, very finely striated, minutely granulated above and decussated with spiral lines below the periphery. Spire conical, slightly globose; suture margined, apex obtuse. Whorls 9, flattened above, a little swollen below, increasing slowly and regularly, the last not descending anteriorly, and scarcely dilated towards the mouth, with an acute pinched keel at the periphery, which is continued upwards above the suture. Aperture oblique, subquadrate; peristome thin, acute, slightly thickened, its margins distant, upper nearly straight, a little reflected, forming an angle with the basal margin, which is arcuate and well reflected; columellar margin dilated above and partly covering the narrow umbilicus.

Diam. maj. 14, min. 12 5; alt. 17 millim.

*Hab.* Than-moi, Tonkin. Type in my collection.

A single specimen received as *G. phonica*, Mab., from Mr. E. Boubée, of Paris, proved upon examination to be a new species. It resembles *G. eximia*, Mldff., but is larger and wider at the base, the keel is more prominent and pinched, and the umbilicus is narrower; the surface is minutely granulated above and spirally striated below, features which are lacking in *G. eximia*. *G. phonica*, *eximia*, and *procera* form a group of which *phonica* is the smallest and *procera* the largest. Mr. Ponsonby possesses a specimen similar to the type. I hope shortly to illustrate this new species, together with some others.

## BIBLIOGRAPHICAL NOTICES.

*International Catalogue of Scientific Literature.* First Annual Issue. M. *Botany.* Published for the International Council by the Royal Society of London. London: Harrison & Sons, 45 St. Martin's Lane. Vol. I. Part 1. 1902 (May). 8vo. Pp. xiv, 378.

We have here the first specimen of the new undertaking initiated by the Royal Society, to take the place of the 'Catalogue of Scientific

Papers,' which at present is only brought down to 1883. The volume under review is due to international co-operation, each country, by its Regional Bureau, undertaking to supply the bibliography of science, to be combined into one whole by the Central Bureau in London. The idea is that of the seventeen annual volumes which are planned each should be devoted to one science, thus making it easy for specialists to subscribe for such portions as they may require.

Although printed by the month of May, the volume has only recently been issued—a delay which must be attributed to the difficulty attending every new issue of similar extent.

The scope of the volume before us may best be given by a statement of its contents. A short preface of five pages explains the foundation of the work, the contributing countries, and the list of subjects, followed by an enumeration of twenty-nine Regional Bureaus and their chiefs, explanations of the method of using the volume, and then the schedule of botanic subjects, each item having a registration number, to facilitate the grouping of titles. While each subject volume is denoted by a letter—*e. g.*, M. Botany, N. Zoology, R. Bacteriology, &c.—each item of the schedule is designated by four figures. Thus, the introductory portion comprises such items as 0040, Addresses, Lectures; 0070, Nomenclature. External Morphology and Organogeny are comprised in numbers 1000 (General) to 1800 (Teratology); similarly Anatomy, Development, and Cytology are numbered from 2000 (General) to 2900 (Cell-formation). The succeeding main headings are:—Physiology, Pathology, Evolution, Taxonomy, and Geographic Distribution. closing with an index of the subheadings. The schedule is also given in French, German, and Italian. Topographical Classification, a scheme common to all the sciences, also appears in the same languages, closing this preliminary matter. The catalogue of books and papers under the title of "Authors' Catalogue" occupies pp. 43–126. The name of the writer precedes the title of his work in usual bibliographic method, followed by the registration number or numbers under which the same paper will be found in the "Subject Catalogue;" these entries are consecutively numbered for reference. The "Subject Catalogue" of 240 pages forms the largest part of the volume; and this feature is peculiar to this series, being entirely absent in the 'Catalogue of Scientific Papers,' so far as that has been issued. Each separate item of the schedule is set out, with the particulars referring to it from the "Authors' Catalogue" repeated; the registration numbers are given at the head of each page as an indication. Under the heading Taxonomy a list of new genera and species is appended to each group—as, for instance, the Algæ, Fungi, and so forth; the running numbers of the "Authors' Catalogue" are here used to show the particular paper in which the species is published. The volume ends with an enumeration of the serials referred to, with the abbreviations employed.

The cover states that the manuscript was completed in January of the present year, from which it may be inferred that the whole of the botanic literature for 1901 is not included. This is explicitly admitted in a notice on page xiv, in which it is stated that the second part of the volume will be issued in a few months.

Practically the whole of the literature published in Great Britain and Ireland is included, but only a portion of some other countries. Germany and the United States are well represented, France less so, while Italy seems quite unrepresented. Japan, in spite of its distance from the Central Bureau, is well to the front, a sign of the energy of that enterprising nation.

It is to be hoped that this endeavour to supply promptly a review of the scientific literature of the world will be successful, and thus supply the worker with information so much needed; in that case the new venture of the Royal Society will earn the hearty thanks of every working naturalist.

*The Fauna of British India, including Ceylon and Burma.* Published under the authority of the Secretary of State for India in Council. Edited by W. T. Blanford.—*Rhynchota.* Vol. I. (*Heteroptera*). By W. L. Distant. London, &c., 1902. Pp. xxxviii, 438.

This valuable series of works on the Fauna of British India continues to make steady progress, and we have now to record the appearance of a volume dealing with the first three families (Pentatomidæ, Coreidæ, and Berytidæ) of the suborder Rhynchota (or Hemiptera) Heteroptera, which comprises the true bugs. Though not one of the largest orders of insects, it includes a considerable number of handsome and interesting forms, and many of the shield-bugs (formerly placed in a distinct family, but now usually included in the Pentatomidæ) rival the most brilliant beetles in their rich metallic hues; and, indeed, many of them might easily be mistaken for beetles at a first glance but for the antennæ; and for the scutellum, which latter often overlaps and covers the wings and wing-cases, and is not divided by a suture down the middle, as are the wing-cases of beetles, which correspond in function and appearance to the scutellum of the shield-bugs.

The general scheme of the work is the same as in previous volumes.

Mr. Blanford's preface informs us of the progress of the present series of works, from which we gather that volumes on Ants by Col. C. T. Bingham, Longicorn Coleoptera by Mr. C. J. Gahan, and another on Land-Mollusca (author not stated) may be expected in the immediate future. Then follows a list of the principal works quoted in the synonymy (pp. v–xi), the Systematic Index (pp. xiii–xxii), the Introduction, the descriptive part of the work, and the Alphabetical Index.

The Introduction details the materials used in the composition of the volume, proceeds to discuss the structure, habits, classification, &c. of the Rhynchota, illustrated by a series of excellent diagrams, and concludes with a synopsis of the families of the Heteroptera.

Mr. Distant's name is a sufficient guarantee for the care and accuracy with which the systematic portion of the book has evidently been compiled; and a word of praise is due to Mr. H. Knight for the series of 249 illustrations in the text, which are among the most excellent which we have seen. They are without colour; but this deficiency is less noticeable in Rhynchota, with their simple colours and patterns, than in the case of Lepidoptera, for instance, with their strongly marked colours and complicated patterns, for the adequate representation of which coloured figures are often almost indispensable.

*Palæontologia Indica.* Series XV. *Himálayan Fossils.* Vol. III. Part 1. *Upper Triassic Cephalopod Faunæ of the Himálaya.* By Dr. Edmund Mojsisovics, Edlem von Mojsvar, Imp. Acad. Vienna, &c. Translated by Dr. Arthur H. Foord, F.G.S., and Mrs. A. H. Foord. Folio. 157 pages, 22 plates, and some woodcuts. Calcutta: Geol. Survey Office. London: Kegan Paul & Co. 1899.

The Introduction (pages 1–4) gives some account of the history of the collecting of these Triassic Fossils of the Himálaya and of the description of allied forms by several authors. The species referred to in the following list are described with few exceptions at pages 5–126.

| AMMONEA TRACHY-OSTRACA. | No. of Species. |
|---|---|
| A. Tropitoidea. | |
| Halorites | 5 |
| Jovites | 3 |
| Parajuvavites | 13 |
| Juvavites. | |
| *a.* Anatomites | 3 |
| *b.* Griesbachites | 2 |
| Isculites | 2 |
| [Woodcut, p. 41.] | |
| Sagenites | 4 |
| [Woodcut, p. 41.] | |
| Didymites | 1 |
| Tropites | 5 |
| Styrites | 2 |
| Eutomoceras | 2 |
| Thetidites | 2 |
| B. Ceratitoidea. | |
| I. Dinaritea. | |
| Ceratites. | |
| *a.* Helictites | 1 |
| *b.* Thisbites | 1 |
| Arpadites. | |
| *a.* Arpadites, s. s. | 3 |
| [Woodcut, p. 58.] | |
| *b.* Dittmarites | 1 |
| *c.* Clionites | 6 |
| *d.* Steinmannites | 5 |
| *e.* Dionites | 1 |
| II. Heraclitea. | |
| Heraclites (Guembelites) | 1 |
| Tibetites. | |
| *a.* Tibetites, s. s. | 4 |
| [Woodcut, p. 78.] | |
| *b.* Anatibetites | 2 |
| *c.* Paratibetites | 5 |
| [Woodcut, p. 84.] | |
| Hauerites | 1 |
| III. Trachyceratea. | |
| Trachyceras. | |
| *a.* Protrachyceras | 1 |
| *b.* Trachyceras, s. s. | 1 |
| Saudlingites | 2 |
| Sirenites | 3 |
| AMMONEA LEIOSTRACA. | |
| A. Arcestoidea. | |
| Arcestes. | |
| Stenarcestes | 1 |
| [Woodcut, p. 97.] | |

| | No. of Species. |
|---|---|
| Arcestes, s. s. | 3 |
| Proarcestes | 1 |
| Lobites | 1 |
| Joannites | 1 |
| Cladiscites (Hypocladiscites) | 1 |
| Paracladiscites | 2 |
| B. Pinacoceratoidea. | |
| Pinacoceras | 2 |
| Bambanagites | 2 |
| Placites | 3 |
| Megaphyllites | 1 |
| Mojsvarites | 1 |
| Phylloceras | 1 |
| Ptychites | 1 |
| Hungarites [Woodcut, p. 119.] | 1 |
| NAUTILEA. | |
| A. Gyroceratidæ. | |
| Pleuronautilus | 2 |
| B. Nautilidæ. | |
| Nautilus | 3 |
| Clydonautilus | 3 |
| C. Orthoceratidæ. | |
| Orthoceras | 1 |
| DIBRANCHIATA. | |
| Aulacoceratidæ. | |
| Atractites | 1 |

In the Results (pages 126–157) the forms described are grouped in zones that correspond mainly, as characterized by the Cephalopods, with the Carnic (page 127) and the Juvarian (page 137) stages of the European Trias, as shown in the accompanying Table, and details are given of the relationship of these stages.

It has been the aim of geologists acquainted with the several faunæ found in these zones to work out the extent and limits of the seas of the Trias Period. The chief of these old marine areas is the so-called Thetys, including:—1. The Mediterranean Province (the most westerly inlet); 2. The Germanic shallow sea; 3. The Indian Province.

"The Germanic shallow sea forms a part of the Mediterranean Province, and may be regarded as an estuary, which was bordered by the extensive continent now sunk in the Atlantic Ocean. This Triassic 'Atlantis' existed probably already at the close of the Palæozoic period. It reached in the west probably as far as the present North-American continent, which, as is known, possesses extensive Triassic lacustrine deposits, of the character of the German Buntsandstein and Keuper in its eastern part; while pelagic deposits of the Trias are to be met with only on the Pacific slopes of this continent."

The Upper Triassic deposits in the Arctic-Pacific Provinces are not yet fully examined, but very interesting results are anticipated for the future. It is known that the Noric Tirolitidæ, spreading from the Mediterranean Province, penetrated to the eastern shore of the Pacific basin, and that "the poor Cephalopod fauna of the Werfen beds extended from the eastern regions of the Thetys into the small Mediterranean area."

Further migrations appear to have occurred while the Mediterranean gulf remained in open connexion with the Thetys. "The Indian regions of the Thetys were in uninterrupted communication with the Arctic regions in the Scythic as well as in the Dinaric period."

The author has elsewhere already referred to the simultaneous occurrence of types in remote regions of the sea and to the surprising fact that in both the Mediterranean and the Indian Trias a con-

| SERIES. | STAGES. | SUBSTAGES. | ZONES OF THE MEDITERRANEAN PROVINCE. |
|---|---|---|---|
| Bajuvarian. | Rhætic. | Rhætic. | 22. Zone of *Avicula concorta.* |
| | Juvarian. | Sevatic. | 21. Zone of *Sirenites Argonautæ.* |
| | | | 20. Zone of *Pinacoceras Metternichi* |
| | | Alaunic. | 19. Zone of *Cyrtopleurites bicrenatus.* |
| | | Lacic. | 18. Zone of *Cladiscites ruber.* |
| Tyrolese. | Carnic. | | 17. Zone of *Sagenites Giebeli.* |
| | | Tuvalic. | 16. Zone of *Tropites subbullatus.* |
| | | Julian. | 15. Zone of *Trachyceras Aonoides.* |
| | | Cordevolic. | 14. Zone of *Trachyceras Aon.* |
| | Noric. | Longobardic. | 13. Zone of *Protrachyceras Archelaus.* |
| | | Fassanic. | 12. Zone of *Dinarites avisianus.* |
| | | | 11. Zone of *Protrachyceras Curionii.* |
| Dinaric. | Anisic. | Bosnian. | 10. Zone of *Ceratites trinodosus.* |
| | | Balatonic. | 9. Zone of *Ceratites binodosus.* |
| | Hydaspic. | Hydaspic. | |
| Scythian. | Jakutic. | Jakutic. | Zone of *Tirolites Cassianus.* |
| | Brahmanic. | Gandaric. | |
| | | Gangetic. | |

| Indian Province. | |
|---|---|
| Himalaya. | Salt-Range. |
| Hochgebirgskalk (?). | Variegated Series. |
| "*Sagenites* beds" (?). | |
| Beds with *Spiriferina Griesbachi.* | |
| Zone of *Steinmannites undulatostriatus.* | |
| Zone of *Clydonautilus Griesbachi.* | |
| *Tropites* Limestone of Kalapani. | |
| *a.* *Daonella* beds.<br>*b.* Beds of *Trach. tibeticum.* | *Pseudharpoceras spiniger* (?). |
| | |
| Zone of *Ptychites rugifer.* | |
| Zone of *Sibirites Prahlada.* | |
| | |
| Beds with *Ceratites subrobustus.* | 8. Zone of *Stephanites superbus.*<br>7. Zone of *Flemingites Flemingianus.*<br>6. Zone of *Flemingites radiatus.*<br>5. Zone of *Ceratites normalis.*<br>4. Zone of *Proptychites trilobatus.*<br>3. Zone of *Proptychites Lawrencianus.*<br>2. Zone of *Gyronites frequens.* |
| Zone of *Otoceras Woodwardi.* | |

cordant order of successive faunæ can be proved to exist. "It is now shown that this phenomenon also extends to the Pacific region, and that it therefore comprises the whole vast region of the pelagic Triassic deposits known to us."

Research in the vast regions of the earth not yet opened out will probably settle the doubts as to the habitats of the original types of now scattered faunæ. "At the time of the Upper Trias remarkable changes in the distribution of continents and in the extent of the seas, especially in the region of the Pacific Ocean, must have taken place." It follows "that changes in the physical characters of the surface of the earth must have most materially influenced the distribution of the organic beings thereon."

*Palæontologia Indica.* Series XVI. *Baluchistán.* Vol. I. *The Jurassic Fauna.* Part 1. *The Fauna of the Kellaways of Mazár Drik.* By Fritz Noetling, Ph.D., F.G.S., &c. Folio. 22 pages, 13 plates. Calcutta: Geol. Survey Office. London: Kegan Paul & Co. 1896.

The lowest formation in the Mari Hills of Baluchistán is a massive limestone, for the most part yielding only some *Terebratulæ* and *Rhynchonellæ*, not well preserved; but a good fossil fauna was found in this rock near Mazár Drik, namely:—Brachiopoda, 2 species; Pelecypoda, 3 spp.; Gasteropoda, 1 sp.; Cephalopoda, 15 spp. Of the last there are three species of Nautiloidea and twelve of Ammomera. The genus *Macrocephalites* predominates; and *M. polyphemus* is the most frequent species. Hence this massive limestone of Baluchistán is called the *polyphemus*-limestone by the Author, and appears to be equivalent to the Charee group of Kutch, and to be homotaxial with the Lower Kellaways Series of Europe.

Of the thirteen plates, pl. i. illustrates *Terebratula ventricosa*, Zieten, *Rhynchonella plicatella*, Sow.; also a *Lima* and a *Pholadomya*. Remains of a *Gervillea* and of a *Pleurotomaria* are also described (page 6).

Plates ii. to xiii. illustrate the following:—

Nautilus wandaensis *, *Waagen.*
—— giganteus *, *d'Orbigny.*
—— intumescens *, *Waagen.*
Harpoceras, sp.
Sphæroceras bullatum, *d'Orb.*
Macrocephalites macrocephalus *, *Schlotheim*, sp.
—— transiens *, *Waagen.*
—— polyphemus *, *Waagen.*
Macrocephalites subcompressus *, *Waagen.*
—— grantanum *, *Waagen.*
—— opis *, *Waagen.*
Perisphinctes balinensis *, *Waagen* (non *Neumeyr*).
—— baluchistensis, sp. nov.
—— recuperoi *, *Gemmellaro.*
—— aberrans *, *Waagen.*

The species marked with an asterisk "have been identified with specimens described from Kutch."

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# XLIX.—*Notes on the Natural History of East Finmark.* By Canon A. M. NORMAN, M.A., D.C.L., LL.D., F.R.S., F.L.S.

I HAD spent three summer holidays in dredging-excursions in South and West Norway, and in 1890 I resolved to go to the extreme north-eastern district of Norway, in order to obtain the more arctic fauna.

East Finmark is a portion of that country which was formerly called Lapland, and commences a little to the east of the North Cape at the Porsanger Fiord. It extends thence to the Russian frontier as its eastern boundary, while to its south lies the northern frontier of Finland.

It is generally known that the extent of the Norwegian seaboard is very great, and is about 2000 miles from Christiania to the Varanger Fiord; but it is not usually realized how greatly the Norwegian coast all the way up trends eastwards, and, of course, directly east after the North Cape has been rounded: so that Vadsö on the Varanger Fiord is not only as far north as Disco in Baffin's Bay and as Icy Cape in Alaska, far within Behring Strait, but also nearly two degrees further east than Constantinople.

The following is the itinerary of my excursion:—

*June* 17.—Left Newcastle by steamer.
19.—Arrived at Bergen, and left by steamer for north the same evening.
25.—Arrived at Tromsö.
28.—Left Tromsö.
*July* 2.—Arrived at Vadsö.
10.—Crossed Varanger Fiord to Kirchenes in Sydvaranger.
28.—Returned to Vadsö.
31.—Left Vadsö.
*Aug.* 6.—Arrived at Svolvær in Lofoten.
11.—Left Svolvær.
18.—Home.

I dredged a little whilst waiting at Tromsö, and on the homeward journey worked for a few days at Svolvær in the Lofoten Islands.

At Tromsö I was joined by Herr J. Sparre Schneider, the friend who was to be my companion and who added so much to the interest and pleasure of my trip. Herr Schneider is the Curator of the Tromsö Museum, and his knowledge of the fauna of arctic Norway, on which he has written so many papers, is unequalled. It was indeed surprising to find at Tromsö, far within the Arctic Circle, a museum in which all departments of the arctic fauna were so fully illustrated and so admirably arranged. At my request Herr Schneider had engaged as my head dredger a young farmer who had a taste for natural history and had sometimes accompanied him in his work at Tromsö. Herr Bersvend Bjerking was a very fine fellow physically, and his invariable good humour, his energy and heartiness in his work, and his never-ceasing attention to myself remain as most pleasant reminiscences.

We left Tromsö, and Herr Schneider thought it well to carry with us in the steamer his small boat fitted for shallow-water work over the 500 (?) miles we had to go, in case there should be any difficulty about boats at our destination. We fortunately, however, had no difficulty in hiring a larger boat at Vadsö and in Sydvaranger. At the latter place our crew was certainly a curiously mixed one, consisting of one Englishman (myself), two Norwegians (Schneider and Bjerking), a Lapp, a Finn, and a Russian.

In the voyage between the North Cape and Vadsö we passed two very famous breeding-places of sea-birds—Sværholtklubben and Syltefjordklubben. The high cliffs were perfectly white with *Larus tridactylus*, and when a gun was fired from the steamer to arouse them, the clouds upon clouds of these gulls and other sea-fowl which filled the air were simply astonishing. Two islands at Vardö are also great breeding-places.

Vadsö is an excellent dredging-station, and the fauna, whether of tide-marks, of shallow depths, or of deep water in the middle of the Varanger Fiord, is most interesting. Nevertheless, we were glad to leave it. The inn was miserable, the place horrid to a degree. The cod brought in here in vast quantity are disembowelled and their heads cut off, and while the fish are hung up on lines to dry the refuse is left rotting on the ground, until it is gathered up in carts and carried to the fish guano manufactory to be boiled down. The stench from the chimney of that manufactory was unbearable. Herr Schneider suggested that we should cross the Varanger Fiord to Sydvaranger, in the hope of being able to find quarters with a landowner at whose house he had previously stayed when on an entomological expedition. This we did, and in the hospitable and commodious house of Herr H. Figenschou found ourselves in the lap of luxury for so outlandish a place. Here was every comfort and kind attention from our good host and his wife, with excellent food—though, of course, fresh meat was not to be expected every day, where it must of necessity be home-killed. "Kirchenes" with its owner's family and its guests—for there were several others besides ourselves—can never be forgotten.

Here at Sydvaranger we were within 7 miles of Russia. All fellow voyagers had been left behind, and among these had been some most interesting companions. During the short summer months many of the government officials appear to go to the furthest north to carry out their inspections. Thus, before coming to Sydvaranger we had met the Harbour Director, the Inspector of Fisheries of Norway, the Inspector of Inland Fisheries of Finland, the head of the Geological Survey, the Professor of Chemistry, Herr Svend Foyn (the great whale-hunter), and others of interest, besides English salmon-fishers, for the rivers of East Finmark are famous for their salmon.

Sydvaranger is, however, beyond the range of ordinary or almost any travellers. Ornithologists have been there; entomologists, especially my friend Herr Schneider, have done excellent work in the district; botanists have added species to the Norwegian flora and worked well there; but the only marine zoologists* who had previously collected in the fiords, as I was informed by Herr Schneider, were Nylander and Gadd, who, in 1855, gave what they had found to the Helsingfors Museum, but did not publish anything on the subject.

The sun never set while we were in East Finmark. Schneider was often entomologizing and I botanizing until near midnight.

I may here add that when dredging we always landed at some spot which had not previously been visited, to have a midday meal and to give our men an hour or an hour and a half's rest. While they were resting Herr Schneider was busy with his net after insects, and more especially Bombyces, which were very abundant and especially affected *Vicia cracca*, a very common vetch of the district, and which there grows with a luxuriance which I have not seen equalled in our own islands. While Schneider was collecting insects I was intent on the botany of the spot.

## *Geography and Geology.*

Norway is divided into Stifts, Amts, and Fogderier. A Stift is a Diocese, and the whole of Norway north of lat. 65° 15′ N. is comprised in the Stift of Tromsö. This great Diocese contains three Amts—Nordland, Tromsö, and Finmark. Of these, Finmark is divided into five Fogderier—Altens, Hammerfest, Tana, Vardö, and Varanger. The first two of these Fogderier belong to West Finmark and the last three constitute East Finmark. East Finmark, as has been already stated, extends from the Porsanger Fiord, which is the next large fiord to the east of the North Cape, to the Russian frontier. Beyond Vardö, the most eastern point, the coast-line trends southward and then westward, forming the large Varanger Fiord, the entrance of which thus faces eastward. The northern shore of the Varanger Fiord is known as Nordvaranger, and here is situated the famous whale-fishing station Vadsö. The territory on the southern side of the Varanger Fiord is Sydvaranger. Running inland to the south from Varanger Fiord is Bog Fiord, which ultimately becomes forked, the western fork being Lang Fiord and the eastern Klosterelv Fiord. On the projecting land which forms these last-named fiords is situated Kirchenes, where we had our quarters. At the head of Klosterelv Fiord is Elvenes, at the mouth of the Pasvik River, which river throughout the greater part of its length from Lake Enara is the boundary between Norway and Russia. A mile or so above Elvenes, however, the Russian boundary crosses the Pasvik, in order to take in a very ancient and highly prized chapel of Boris Gleb, which Russia insisted on possessing. By the kind invitation of Madame Prebensen, the wife of the Amtmand (=a sort of Lord Lieutenant, but with much more extended powers), who was staying at Elvenes, I accompanied her to Boris Gleb, where we were most hospitably entertained by the Russian priest. The little old chapel, now no longer used, with the ancient vestments preserved in it, is very interesting. The inhabitants of the little village are Lapps, who belong to the old Greek Church *, and retain many curious old customs. They do not smoke; they will not eat or drink out of any vessel which has been used by those not of their peculiar faith. Formerly there were castrati among them for the Kingdom of God's sake; but this rite is no longer practised, unless secretly, since it has been forbidden by the government. The priest does not, of course, share these old superstitions and views.

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* Except M. de Guerne, for whose expedition see observations in succeeding part of this paper.

The population of East Finmark embraces a mixture of Norwegians, Fins, and Lapps.

The Fins or Quains are as tall as Norwegians, and well-made men. They have usually little or no hair on the chin or cheeks, and but slight moustache; the hair is light or brown, less often dark, the cheek-bones usually high, and the eyes mostly of a cold blue colour.

The Lapps are short, and their average height not more perhaps than 5 feet. There are three sections of them:—

(*a*) Mountain or Nomadic Lapps. These are the purest breed. They are characterized usually by broad faces and dark hair, and are very commonly bow-legged. They live in tents, or, in winter, in temporarily constructed huts—wandering from place to place, in order to procure the reindeer-moss or other food for their herds of reindeer. Their clothes are chiefly made from the skins of those animals.

(*b*) River Lapps. These reside in the river-valleys of the extreme north. They are agriculturists, cultivating the land and having their cattle and sheep, and also feeding on the salmon in which the rivers (*e. g.*, Tana) abound. The only reindeer they have are for use in sledging.

(*c*) Sea Lapps. These reside on the coast and fish in the sea. With Sea Lapps Norwegians occasionally intermarry, but very rarely with Nomadic Lapps. When on my voyage north we stopped at Hammerfest, a Norwegian companion with whom I became acquainted on board lionized me through this most northern town in the world, showing me its reservoir, fountain, buildings, &c. It was Sunday morning. The bell was ringing for service, and the Sea Lapps were trooping to it; their dress was extremely pretty and picturesque, consisting of white flannel bound with crimson or bright blue. I was much pleased with the place, and resolved on my homeward journey to stop there for a week's dredging. The entire town, with all its warehouses and church, was built of wood. Only a week later news came to us at Vadsö that the whole town had been destroyed by fire. When the steamer touched there on my return voyage not a single house or building remained. The coal-heap by the wharf was still burning; all else was blackness and ruin. I went to where the church had stood, and there found and brought away a piece of the melted bell which I had heard summoning the Lapps to their morning service.

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* All Lapps in Russia belong to the Greek Church; but those who live in the Swedish and Norwegian parts of what used to be called Lapland are Lutherans.

There is an affinity between the languages of the Lapps and Quains; but they differ entirely from all other European languages, the nearest perhaps being Hungarian.

Norway is, as it were, a skeleton. Denudation during the Glacial Epoch has been carried to an extreme; almost all sedimentary rocks have been swept off into the sea, and primary rocks for the most part alone remain. It is this which gives such a peculiar facies to the scenery within vision, for as we steam along the entire coast roches moutonnées everywhere meet the eye. Here and there, of course, some sedimentary rocks are still to be found. One of the most important deposits in northern Norway is on the outlying island of Ando, lat. 69°, which is at the northern extremity of Nordland. In this island there is a small Jurassic deposit characterized by such fossils as *Ammonites*, *Belemnites Blainvillei*, Desh., and *brevicornis*, Voltz, *Gryphæa dilatata*, Sow., several *Pectens*, *Lima duplicata*, Sow., *Astarte excavata*, Sow., *Scleropteridium Dahllianum*, Heer, *Pinus Nordenskiöldi*, Heer, *P. microphylla*, Heer, &c., &c. There is also here a seam of inferior coal.

Other small deposits of secondary rocks occur here and there on the islands to the north of this; but on the mainland up to Hammerfest and the North Cape we meet with igneous rocks, gneiss, granite, and serpentine. At the North Cape first appears a series of rocks of unknown horizon called the

"Gaisa"* system. It consists of two series—an upper, which is continued from the North Cape along the East Finmark coast as far as the Tana Fiord; and a lower series, commencing on the eastern side of the Tana Fiord and extending thence to Nordvaranger. The "Gaisa" system is composed of conglomerates embracing lumps of sandstone, quartz, granite, dolomite, &c. Up to the time of my visit all attempts to find embedded fossils in the fragments of these conglomerate rocks, and thus obtain a clue to their age, had been unavailing. A beautiful section of these rocks was seen from the steamer as we passed Kjolle and Ox Fiords, the strata presenting layers of very varied and lovely colouring. The geological formation at Vadsö and the northern shores of the Varanger Fiord consists of "Gaisa," with some glacial deposits here and there along the shore; but on crossing the fiord to Sydvaranger this interesting formation is left behind and the rocks are again igneous. This geological change, of course, cannot be without exhibiting effects on the flora and perhaps also on the fauna of the fiords.

The chief factor, however, which influences the fauna of East Finmark consists in the difference of climate. West Finmark, up to the North Cape and beyond it, is indebted to the influence of the Gulf Stream for a temperature all through the winter months which keeps the sea free from ice. The climatic conditions of the Varanger Fiord are, however, very different, and the smaller fiords, such as those of Sydvaranger, where my dredging was chiefly carried on, are completely frozen over from December or January to the middle of May or into June, the ice attaining a thickness of 2 to 3 feet. As a necessary consequence the fauna of the Varanger Fiord and of the other fiords of that district is of more arctic character than that round the North Cape, although in latitude the latter is somewhat more northern. In the summer months the difference of temperature is evidenced by the dense fogs which are commonly met with off the coast of East Finmark, and which are the result of contact of the warm air coming from the west with the cold currents passing westward from the Kara Sea. It was in one of these fogs, during which we had to lie to for twenty-seven hours, that while other passengers were filling great tubs with the cod which so freely took the bait, I employed my time in casting from the deck of the steamer a little hand-dredge off the mouth of Laksefjord, and thus obtained animals some of which are recorded as from that locality in the following notes.

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* Gaisa, the name of a mountain in the Porsanger district.

## MAMMALIA.

The following notes on a few of the mammals were given me in conversation by Herr J. Sparre Schneider when we were together in Finmark.

*Ursus arctus*, Linn. (Brown Bear.) Occurs through Norway; abundant in the valleys of Tromsö Amt, but scarce in East Finmark.

*Gulo luscus*, Linn. (Glutton.) Common in East Finmark, as throughout mountains of Norway.

*Mustela martes*, Linn. (Pine-Marten.) Occurs in West Finmark and perhaps in East.

*Putorius ermineus*, Linn. (Ermine.)

*Canis lupus*, Linn. (Wolf.) Common in East Finmark, but almost extinct in the rest of Norway. It comes in numbers on the ice in winter on the Pasvik River. Nine were killed one night by Herr Figenschou about five years before I was staying with him.

*Vulpes alopex*, Linn. (= *V. vulgaris*, Briss.). (Common Fox.) Common.

—— *lagopus*, Linn. (Arctic Fox.) Found throughout Norway, but most abundant in mountains of Finmark. Two hundred were killed by poison in one winter at Vadsö some years ago.

[*Felis lynx*, Linn. (Lynx.) Does not occur in East Finmark. It has been killed in West Finmark, and is most abundant in the neighbourhood of Trondhjem, coming into the outskirts of the town in the winter months.]

*Trichechus rosmarus*, Linn. (Walrus.) Has been seen rarely in Finmark.

*Halichœrus grypus*, Fabr. (Grey Seal.) Breeds at Trondhjem, but does not now reach East Finmark, although bones of it have been found there.

*Erignathus barbatus*, Fabr. (Great Seal.)

*Phoca vitulina*, Linn. (Common Seal.)

—— *fœtida*, Fabr., = *P. annellata*, Schinz, = *P. hispida*, Schreb. (Marbled Seal.)

*Pagophilus grœnlandicus*, Fabr. (Greenland Seal.)

*Lemmus norvegicus*, Desm. (Lemming.)

*Evotomys ruficanus*, Sund.

*Microtus ratticeps*, Keys. & Blas. No rat or house-mouse occurs in East Finmark.

*Alces machlis*, Gray. The Elk is now altogether absent from, or, if present, very rare in, East Finmark, nor is it found on the west coast of Norway. It is still abundant about Namsos and a little further north.

*Rangifer tarandus*, Desm. All the Reindeer in East Finmark are now tame. They are still wild in the Hardanger district and in the central range of mountains.

*Megaptera boops*, Linn. Not so common as the two following.

*Balænoptera musculus*, Linn. This and the next are the two great whales, measuring when adult 70–80 feet in length, which chiefly occur at Vadsö.

—— *Sibbaldii*, Gray.

—— *borealis*, Lesson. Sporadic at Vadsö, more common in West Finmark.

—— *rostrata*, Fabr. Smaller species; not hunted, caught in nets and often shot. Chiefly found in Bergen district, occasionally in East Finmark.

*Balæna biscayensis*, Gray. Extinct in East Finmark for some 200 years (?); bones found at Vadsö and Sörö.

*Hyperoodon rostratus*, O. F. Müll. (Bottle-nosed Whale.) Chiefly killed in Arctic seas, but occurring in ice-floes to the north of East Finmark.

*Monodon monoceros*, Linn. (Narwhal.) Killed once in Varanger Fiord about eighty years ago.

*Delphinapterus leucas*, Pallas. (White Whale.) This species, the inhabitant of the seas of Nova Zemblia, Spitsbergen, Greenland, and N.E. America, has occurred off the East Finmark coast.

*Orca gladiator*, Laplace. (Grampus.) Rarely killed. It swims in herds and attacks the great whales.

*Globocephalus melas*, Traill. Occasional; chiefly enclosed by nets in narrow fjords and then shot. As many as 2500 have been killed at Lofoten at one time.

*Lagenorhynchus albirostris*, Gray. Occurs throughout the whole of Norway.

The whales which are chiefly killed for oil are *Megaptera boops*, *Balænoptera Sibbaldii*, *musculus*, *borealis*, and *rostrata*. Some years ago Vadsö was the great centre of Norwegian whale-fishery; I have a note (but do not remember whence it was taken, and therefore, though I believe it to be correct, I cannot vouch for its accuracy) that in 1884 450 whales were killed, in 1885 1398, and in 1886 954. When the fishery was at its height the harbour of Vadsö was covered with floating oil, and the stench from the dead whales must have been something frightful. The fishery at Vadsö was at the time of my visit closed; but the fishery was still continued at Mehavn, Sörö, and Jan Fjord. But the whales are now scarce. I only saw one which had been killed and perhaps half a dozen alive spouting. Their great destruction has been due to the mode of slaughter invented by the well-known

Herr Svend Foyn, whom I saw as an old man, and who has since died. He hunted the whales in steamers of about 80 tons, with engines of about 30 horse-power, shooting the whales with harpoons to which were attached cartridges, which, exploding, blew holes in the whales' sides.

## MOLLUSCA.

The following catalogue contains all the Mollusca which are known to occur in East Finmark. The species found by myself have a locality attached; species of which the name only is given are inserted on the authority of G. O. Sars and others; species in this and other lists which have a * prefixed were procured by me in 1890 either at Tromsö or Svolvær, Lofoten Islands, but not in East Finmark.

### CEPHALOPODA.

The following seven species are recorded by G. O. Sars:—

*Ommastrephes sagittatus*, Lamarck.

*Gonatus amœnus*, Lichtenstein.

*Rossia glaucopis*, Lovén.

*Octopus arcticus*, Prosch.

### PTEROPODA.

*Limacina helicina*, Phipps.

—— *balea*, Möller.

*Clione limacina*, Phipps.

### GASTROPODA.

**Tornatina nitidala*, Lovén. Svolvær, Lofoten, 5–10 fathoms.

—— *pertenuis*, Gould. Vadsö, in 5–25 fathoms; Klosterelv Fiord.

*Cylichna alba*, Brown. Very common in East Finmark.

var. *corticata*, Beck. Vadsö and Sydvaranger.

—— *propinqua*, M. Sars. In shallow water at Vadsö and in all the Sydvaranger fiords.

*Diaphana hyalina*, Turton. Vadsö and Klosterelv Fiord.

—— *globosa*, Lovén, =*hyemalis* (Gould), G. O. Sars. Bog and Klosterelv Fiords, but only a single specimen in each locality.

*Scaphander punctostriatus*, Mighels.

*Philine finmarchica*, M. Sars. Bog Fiord.

—— *quadrata*, S. Wood. Lang Fiord, very fine specimens.

*—— *scabra*, Müller. Lofoten.

—— *lima*, Brown. Vadsö and Bog Fiord.

*Philine fragilis*, G. O. Sars.

*Acanthodoris pilosa*, Müll. Tide-marks, Vadsö.

*Lamellidoris muricata*, Müll. Tide-marks, Vadsö.

—— *bilamellata*, Linn. Vadsö Sound.

*Doris obvelata*, Müll. Tide-marks, Vadsö.

*Issa lacera*, Müll.

*Dendronotus frondosus*, Ascanius. Vadsö.

—— *velifer*, G. O. Sars.

*Æolidia papillosa*, Linn. Vadsö.

*Limapontia capitata*, Müller. Tide-marks, Vadsö.

*Bela pyramidalis*, Ström. Vadsö and fiords of Sydvaranger; also Lofoten.

var. *semiplicata*, Sars. Vadsö.

—— *Pingelii*, Beck. Harbour at Vadsö, and in a bay west side of Bog Fiord.

—— *rugulata*, Troschel. Abundant.

var. *assimilis*, G. O. Sars. Bog and Lang Fiords.

—— *nobilis*, Möll. Varanger and Sydvaranger Fiords.

—— *scalaris*, Möll. Lang Fiord, 5–15 fathoms, one large living specimen; Vadsö Harbour, one dead.

—— *exarata*, Möll., = *mitrula*, Lovén. The most abundant *Bela* in the district.

—— *obliqua*, Möll. One living specimen in Lang Fiord, 5–15 fathoms.

—— *cancellata*, Migh., = *elegans*, Sars. Klosterelv and Lang Fiords.

var. *declivis*, Lovén. Much more frequent than the type, Varanger and Sydvaranger Fiords.

—— *Trevelyana*, Turton. Varanger Fiord, down to 125 fathoms; fiords of Sydvaranger and also Lofoten.

—— *decussata*, Couthouy, = *viridula*, Möll. Vadsö and Bog and Lang Fiords.

var. *conoidea*, G. O. Sars.

—— *tenuicostata*, M. Sars. One only in Bog Fiord, 100–125 fathoms.

—— *harpularia*, Couthouy. Vadsö, Bog and Lang Fiords, 5–30 fathoms.

—— *Kobelti*, Verkrüzen, = *B. viridula*, G. O. Sars (non Möll.). Varanger Fiord, east of Vadsö, in 10–25 fathoms.

—— *cinerea*, Möll.

—— *bicarinata*, Couthouy.

var. *violacea*, Migh. In all the fiords and at Lofoten in 5–30 fathoms.

*Bela bicarinata*, var. *cylindracea*, Beck. One living in 100–120 fathoms, Bog Fiord.

—— *angulosa*, G. O. Sars.

—— *simplex*, Midd.

—— *expansa*, G. O. Sars.

**Clathurella linearis*, Montagu. Svolvær, Lofoten.

*Typhlomangelia nivalis*, Lovén.

*Spirotropis carinata*, Phil.

*Teretia amœna*, G. O. Sars. A living specimen, Varanger Fiord, 125–150 fathoms.

*Taranis cirrata*, Brugnone, = *T. Mörchi*, Malm. Klosterelv and Bog Fiords, 5–10 fathoms.

*Admete viridula*, Fabr. Throughout the district, and of larger size than it attains in West Norway; reaches 16 millim. in length.

var. *undato-costulata*, Verkrüzen. Vadsö and Sydvaranger, and as large as the types.

*Trophon truncatus*, Ström. Living between tide-marks at Vadsö, and dredged in 5–30 fathoms in all the Sydvaranger fiords examined.

—— *clathratus*, Linn. In all the fiords down to 120 fathoms.

var. *Gunneri*, Lovén. Varanger, Lang, and Bog Fiords, 15–80 fathoms.

—— *barvicensis*, Johnston. "Porsanger Fiord" (*fide* Friele).

*Purpura lapillus*, Linn., and var. *imbricata*, Lamk. Vadsö, of a rich purplish-brown colour.

*Astyris rosacea*, Gould. Lang, Klosterelv, and Bog Fiords, and at Svolvær, Lofoten, 5–50 fathoms.

*Nassa incrassata*, Ström. Svolvær, Lofoten. Recorded by G. O. Sars from East Finmark.

*Boreofusus berniciensis*, King.

*Volutopsis norvegica*, Chemn.

*Ukko Turtoni*, Bean. Vardö, fishermen's lines.

*Neptunea despecta*, Linn. Bog Fiord; Vardö, fishermen's lines; Svolvær, Lofoten.

*Sipho gracilis*, Da Costa, var. *glabra*, Verkr. Vardö, from fishermen's lines.

—— *islandicus*, Chemn. Vardö, fishermen's lines.

—— *latericeus*, Müll. Varanger Fiord, 100–125 fathoms, and Lang Fiord, 3–30 fathoms.

*Siphonorbis Verkrüzeni*, Kobelt.

—— *lachesis*, Mörch.

—— *tortuosus*, Reeve.

var. *turritus*, M. Sars. Vadsö.

*Siphonorbis ebur*, Mörch.

—— *fusiformis*, Brod.

*Buccinum undatum*, Linné.

var. *borealis*, nov. nom., = var. *pelagica*, G. O. Sars (but not var. *pelagica*, King). Vadsö, in shallow water. The nearest approach to the form that we have in British seas is var. *flexuosa* of Jeffreys, from Shetland, which it resembles in its elongated form and flexuose ribs; but the latter is a much more delicate and in all respects more elegant form.

var. *cærulea*, G. O. Sars. This variety is found at low water at Vadsö; the substance of the shell is commonly of a rich vinous-purple colour, which is especially evident on the columella. Sars says of the colouring "fusco-cærulea, faucibus intense nigro-castaneis." The ribs are often almost entirely absent on the lower whorls. It passes into var. *borealis* at a few fathoms depth.

var. *Schneideri*, Verkrüzen. A beautiful pure white form which comes up very constantly on the fishermen's lines at Vardö. I have seen half-grown specimens which might pass for the rare white variety of var. *zetlandica*; but the form is much less produced than in that variety from the Shetland Haaf; the whorls are more tumid and the ribs much more developed. Occasionally pure white examples of var. *zetlandica* occur; but in the case of var. *Schneideri* the whole race is a pure white one—at least, I did not see any similar specimens of a different colour on the quay at Vardö.

*Buccinum finmarchianum*, Verkrüzen. This beautiful species is brought up in great numbers by the Vardö fishermen's lines; among a large number which I procured at Vardö there was a single white specimen. I have an example in my cabinet, kindly given me by Herr Schneider, which is no less than 80 millim. long; it is referable to var. *attenuata*, G. O. Sars; 60 millim. may be considered as the ordinary limit of measurement of a full-grown shell. Sars gives as measurement of the usual form 55 millim., of var. *attenuata* 58 millim., of var. *scalaris* "Long. usque ad 65 mm."

*Buccinum grœnlandicum*, Chemnitz. Between tide-marks, Vadsö.

var. *nuda*. I propose this name for a remarkable form of *Buccinum* to be found on the outer side of the island which shelters the harbour of Vadsö. The form is more evenly conical than *grœnlandicum*, the whorls usually being flatter and the suture less deep. In general the whorls are perfectly smooth, without any trace of ribs, riblets, or puckers; but in other cases flexuous ribs are, more or less, developed on all the whorls accompanied by spiral riblets, and the resemblance to *B. undatum* becomes so exact that such a specimen taken by itself might be ascribed by a conchologist as being without doubt a small variety of that species. The colour varies greatly: some are pure white, others rich purple, others mottled with rufous spots on a paler yellowish ground. The length of full-grown specimens is an inch and a half. I have left to the last the important character which distinguishes it so markedly from *B. grœnlandicum*: the *epidermis is perfectly smooth*, and at no age, nor on any specimen that I have seen, could a trace be found of the longitudinal epidermal pleats, crowned with backward directed setose processes, which are so characteristic of *B. grœnlandicum*. It is not *B. parvulum*, Verkrüzen, it is not at all like his figures, nor has it anything to do with a specimen in my collection which came thus named from him indirectly to myself, and which agrees perfectly with his figures, and has the seta-crowned epidermal pleats of *B. grœnlandicum*. I previously, however, had the form *nuda* in my collection (*a*) from Professor G. O. Sars, and (*b*) from Verkrüzen, labelled in his writing "*Buccinum* ? n. sp., Finmark occidentalis"; and also a shorter form of the same thing, with the mouth somewhat more expanded, received from Prof. Sars, "*Buccinum grœnlandicum*, var. *patula*." I am rather inclined to believe that this form is not, in the ordinary sense of the term, a variety, but that it is a hybrid between *B. undatum* and *B. grœnlandicum*. The conditions under which it occurs are curious. The island to which I have referred is only a little place. At its north-eastern corner between tide-marks *B. undatum*, var. *cœrulea*, G. O. Sars, is found accompanied by ordinary *B. grœnlandicum*. A little further round—though really close by—for perhaps a hundred yards or so, var. *nuda* occurs in the greatest profusion; and beyond this again *B. grœnlandicum* takes its place with the usual epidermis. The purple colour so prevalent in var. *nuda*, but totally absent in the normal forms, is exactly the same colour which is so marked in Sars's *B. undatum*, var. *cœrulea*.

*Buccinum hydrophanum*, Hancock, var. *tumidulum*, G. O. Sars. Varanger Fiord in 100–150 fathoms.

*Odostomia turgida*, G. O. Sars.

—— *turrita*, Hanley.

—— *unidentata*, Mont.

*Liostomia eburnea*, Stimpson. Vadsö, in 10–25 fathoms.

*Pyrgulina eximia*, Jeffreys.

—— *spiralis*, Montagu.

*Eulima bilineata*, Alder. Entrance to Vadsö Harbour.

*Scalaria grœnlandica*, Möll. Vadsö and Svolvær, Lofoten, 10–25 fathoms.

var. *Loveni*, G. O. Sars. One only. Lang Fiord, 15–25 fathoms.

var. *crebricostata*, G. O. Sars. One only. Varanger Fiord, 100–125 fathoms.

*Scalaria obtusicostata* (S. Wood), G, O. Sars.

*Læocochlis granosa*, Wood.

*Cerethiopsis costulata*, Möll. Lang Fiord, 30 fathoms; Bog Fiord, 20–30 fathoms.

*Newtoniella metula*, Lovén.

*Turritellopsis acicula*, Stimpson. Vadsö and Varanger Fiord, in shallow water to 15 fathoms.

*Trichotropis borealis*, Brod. & Sow. Lang and Bog Fiords and also Lofoten, down to 80 fathoms.

—— *conica*, Möll.

*Littorina littorea*, Linn. Vadsö, Lang Fiord, &c.

—— *rudis*, Maton, var. *grœnlandica*, Möll. Extremely abundant. When found near or quite at high-water mark on rocks it is of smaller size than when living lower down, and at the same time more richly coloured. The colour is very variable: pure white; white banded with black or brick-red; grey; grey mottled with dispersed yellow spots; black; black banded with white. A form taken in Bog Fiord has the spire more elevated than usual, and corresponds to our English var. *tenebrosa*. The surface of the shell is usually smooth or sculptured only with slightly elevated spiral ridges. At Vardö, however, a large variety occurs which is girt with strong spiral ribs, and is quite indistinguishable from *Littorina sitchana*, Philippi, from Vancouver and the Behring Sea. It is figured by Sars, Moll. Reg. Arct. Norv. pl. ix. fig. 10.

*—— *obtusata*, Linn. Occurs of quite the normal British form and appearance at Svolvær, Lofoten. In East Finmark it gives place to the following very remarkable varieties:—

var. *palliata*, Say, Sars, pl. ix. fig. 9. Tromsö, Vardö, Vadsö, &c.

forma *elatior*, Sars, pl. xxi. fig. 19, has the spire so much elevated that it has the shape of *L. rudis*; it occurs between tide-marks not far from low-water mark at Vardö.

forma *coarctata*, Sars, pl. xxi. fig. 20. This extraordinary shell occurs with the last at Vardö, and is indeed an extreme form of forma *elatior*, with which, and with *palliata* of ordinary form but of large size, it is found.

*Lacuna pallidula*, Da Costa. Tide-marks, Vadsö.

—— *divaricata*, Fabr., var. *solidula*, Lovén. Vadsö and Bog and Klosterelv Fiords.

var. *frigida*, Lovén. Klosterelv Fiord. In both these varieties the specimens have been compared with cotypes received from the late Professor Lovén.

*Skenea planorbis*, Fabr. Vadsö; Klosterelv Fiord and Svolvær.

*Hydrobia minuta*, Totten.

**Rissoa parva*, Da Costa. Svolvær. The type not from East Finmark.

var. *interrupta*, Adams. Vadsö and Svolvær.

*Alvania Jan-Mayeni*, Friele. Varanger Fiord, in 100–125 fathoms. New to the Norwegian fauna.

—— *Jeffreysii*, Waller.

*Cingula castanea*, Möll. Lang Fiord, in 5 fathoms.

—— *tumidula*, G. O. Sars.

*Onoba striata*, Adams, var. *saxatilis*, Möll. (=*aculeus*, Gould). Tide-marks and shallow water, Vadsö; Lang and Bog Fiords; Svolvær.

*Jeffreysia globularis*, Jeffr. Klosterelv and Lang Fiords, 5–15 fathoms.

*Homologyra atomos*, Philippi.

*Velutina lævigata*, Penn. Lang and Bog Fiords.

—— *lanigera*, Möll.

*Morvillia undata*, Brown. Lang Fiord.

*Velutella flexilis*, Mont.

—— *cryptospira*, Midd.

*Marsenia prodita*, Lovén.

—— *micromphala*, Bergh.

—— *grœnlandica*, Möll.

*Onchidiopsis glacialis*, M. Sars.

*Natica affinis*, Gmel., = *N. clausa*, Brod. & Sow. In all the East Finmark Fiords and at Lofoten.

**Lunatia Alderi*, Forbes. Svolvær.

*—— *Montagui*, Forbes. Svolvær.

—— *grœnlandica*, Beck. Lang and Bog Fiords and Svolvær, 5–120 fathoms.

—— *nana*, Möll. Vadsö, in 10–50 fathoms.

*Amauropsis islandica*, Gmel. Vadsö and middle of the Varanger Fiord, 10–125 fathoms.

*Calliostoma occidentale*, Migh. & Ad. Bog Fiord, 20–30 fathoms.

*Machæroplax obscura*, Couth.

var. *bella*, Verk. Varanger, Lang, Bog, and Klosterelv Fiords, in shallow water.

var. *albula*, Gould. Vadsö, in 10–25 fathoms.

—— *varicosa*, Migh. Vadsö and Bog Fiord.

**Gibbula cineraria*, Linn. Svolvær.

—— *tumida*, Mont. Svolvær; and given to me by Herr Dahl, of Vardö, as from that place.

*Margarita grœnlandica*, Chemn. In all the East Finmark Fiords, at Tromsö, and at Svolvær.

var. *lævior*, Jeffr. With the last.

*Margarita olivacea*, Brown. Varanger, Lang, and Bog Fiords.

—— *cinerea*, Couth. Throughout the district from shallow water to 125 fathoms.

—— *helicina*, Phipps. Vadsö; Lang and Bog Fiords.

*Mölleria costulata*, Möll. Vadsö; Lang, Bog, and Klosterelv Fiords.

*Cyclostrema Petterseni*, Friele. Klosterelv and Bog Fiords in shallow water.

*Scissurella crispata*, Flem. In all the Sydvaranger Fiords.

*Puncturella noachina*, Linn. Throughout the district.

*Lepeta cœca*, Müll. Throughout the district.

*Pilidium fulvum*, Müll.

*Acmæa virginea*, Müll. Varanger, Klosterelv, and Bog Fiords; and at Svolvær.

—— *testudinalis*, Müll. Vadsö and Sydvaranger Fiords.

—— *rubella*, Fabr.

## POLYPLACOPHORA.

*Tonicella marmorea*, Fabr. Throughout the district, but small.

*Trachydermon ruber*, Lowe. Common everywhere, but small.

—— *albus*, Linn. Throughout the district.

*Leptochiton arcticus*, G. O. Sars. Vadsö and Lang Fiord.

*Hanleyia debilis*, Gray. Lang Fiord; one very fine, measuring 22 millim. when dried. It thus approaches *H. abyssorum*, M. Sars.

## SCAPHOPODA.

*Dentalium entalis*, Linn. Vadsö; Lang and Bog Fiords.

—— *occidentale*, Stimpson. Vadsö.

*Siphonodentalium vitreum*, M. Sars. Varanger, Lang, and Bog Fiords, down to 125 fathoms.

## PELECYPODA.

*Anomia ephippium*, Linn. Varanger and Klosterelv Fiords.

var. *aculeata*, Müll. Svolvær. Sars records it from East Finmark.

*Pecten islandicus*, Müll. Varanger and Klosterelv Fiords.

—— *tigrinus*, Müll. Lang Fiord.

—— *septemradiatus*, Müll.

—— *imbrifer*, Lovén.

—— *grœnlandicus*, Sow. Varanger and Bog Fiords, in 80–125 fathoms.

*Limea Sarsi*, Lovén.

*Mytilus edulis*, Linn. In several places.

*Modiola modiolus*, Linn. Lang and Klosterelv Fiords.

—— *phaseolina*, Phil. Vadsö and Lang Fiord.

*Modiolaria discors*, Linn. Among Corallina in rock-crevices between tide-marks at the back of the island which forms the harbour of Vadsö.

—— *lævigata*, Gray. Bog and Lang Fiords, in 10–30 fathoms.

—— *nigra*, Gray. In all the Fiords, but not abundant, and I saw no large specimens, 10–125 fathoms.

—— *corrugata*, Steenst. Lang Fiord, in 15–25 fathoms.

*Dacrydium vitreum*, Möll. Varanger, Bog, and Lang Fiords, in 30–125 fathoms.

*Crenella decussata*, Mont. Vadsö, and all Sydvaranger Fiords, in 15–125 fathoms.

*Arca glacialis*, Gray. Varanger and Bog Fiords, 30–125 fathoms.

*Nucula tenuis*, Mont. Abundant throughout the district.

—— *delphinodonta*, Migh.

*Leda minuta*, Müll. Throughout the district.

—— *pernula*, Müll. Throughout the district.

*Yoldia limatula*, Say. A dead specimen brought up in a small dredge which I threw out from the steamer when lying in a fog off the mouth of Laksefiord.

*Portlandia lucida*, Lovén. Varanger and Lang Fiords, in 25–125 fathoms.

—— *intermedia*, M. Sars. Varanger, Lang, and Bog Fiords, 80–125 fathoms.

—— *lenticula*, Fabr. Varanger, Lang, and Bog Fiords, in 5–100 fathoms.

—— *frigida*, Torell. In all the fiords, in 5–125 fathoms.

*Astarte compressa*, Linn. (=*A. elliptica*, Brown). In all the fiords of Sydvaranger, in 5–50 fathoms.

—— *borealis*, Chemn. Lang Fiord, Tromsö and Svolvær.

var. *placenta*, Mörch. Klosterelv Fiord, 5 fathoms.

—— *crebricostata*, Forbes. Varanger, Lang, and Klosterelv Fiords, in 5–125 fathoms.

—— *striata*, Leach (=*compressa*, Mont., non Linn.). Vadsö; Lang and Klosterelv Fiords, in 5–25 fathoms. Species showing considerable variation. A striking feature in East Finmark is the great abundance of Nuculidæ and Astartidæ.

*Turtonia minuta*, Fabr. Tide-marks, Vadsö and Klosterelv Fiord.

**Montacuta bidentata*, Mont. Svolvær.

*—— *ferruginosa*, Mont. Svolvær.

—— *Maltzani*, Verk.

**Cardium echinatum.* Svolvær.

—— *elegantulum*, Beck. Varanger, Lang, and Bog Fiords, 25–125 fathoms.

—— *ciliatum*, Fabr. (=*islandicum*, Chemn.). Varanger, Lang, and Klosterelv Fiords, 5–25 fathoms.

—— *fasciatum*, Mont. In all the fiords, also at Tromsö and Svolvær.

*Serripes grœnlandica*, Linn. In Laminarian zone throughout the district.

*Cyprina islandica*, Linn. Klosterelv Fiord, 2–5 fathoms. The extreme profusion in which this species occurs in the Glacial Clays of Scotland I had always supposed to be a state of things which had entirely passed away; until at Svolvær, Lofoten Islands, I found *Cyprina* living in the same extraordinary abundance. The shore there is densely strewn with the dead shells and their comminuted remains which have been cast up.

*Venus gallina*, Linn. Vadsö.

—— *casina*, Linn. "Vardö," *fide* Lovén.

*Timoclea ovata*, Penn. Svolvær. Entered by Sars as found in East Finmark.

*Thyasira flexuosa*, Mont.

var. *Sarsii*, Phil. Vadsö, Klosterelv and Bog Fiords, and at Svolvær.

var. *Gouldii*, Phil. Varanger, Lang, and Bog Fiords, 20–125 fathoms.

—— *obesa*, Verrill. Vadsö, in 10–25 fathoms.

*Axinopsis orbiculata*, G. O. Sars. Vadsö and all the Sydvaranger Fiords, in 2–50 fathoms.

*Lucina borealis*, Linn. Svolvær. Sars records it from East Finmark.

*Mactra elliptica*, Brown. Vadsö.

—— *subtruncata*, Da Costa. Lang Fiord. A single specimen.

**Syndosmya prismatica*, Mont. Svolvær.

*Tellina balthica*, Linn. Very abundant; living between tide-marks in Klosterelv and Lang Fiords. The shells are of comparatively small size, with a dull chalky-like surface. The substance of the Klosterelv shells is white, while that of almost all those from Lang Fiord is pink.

—— *calcarea*, Chemn. Vadsö; Lang and Klosterelv Fiords; also Svolvær.

*—— *fabula*, Gmel. Svolvær.

*Mya arenaria*, Linn. Vadsö; Klosterelv Fiord; Svolvær.

—— *truncata*, Linn. One dead, Klosterelv Fiord.

*Corbula gibba*, Olivi.

*Panopea norvegica*, Spengler. Dead valves, perhaps fossil, in Klosterelv Fiord. Sars records this from West but not from East Finmark.

*Saxicava rugosa*, Linn. Common throughout the district.

var. *arctica*, Linn. Occasional.

*Thracia truncata*, Brown. Varanger and all the Sydvaranger Fiords, 3–30 fathoms.

*Cuspidaria arctica*, M. Sars. This very large and fine species was found in the Varanger and Bog Fiords in 80–125 fathoms, but very rare.

—— *glacialis*, G. O. Sars. Varanger Fiord; rare in 100–125 fathoms.

—— *subtorta*, G. O. Sars. Varanger, Lang, and Bog Fiords, in 3–30 fathoms.

—— *obesa*, Lovén.

*Poromya granulata*, Nyst and West. "Porsanger Fiord," *fide* Friele.

## BRACHIOPODA.

*Terebratulina caput-serpentis*, Linn., var. *septentrionalis*, Couth. Lang and Bog Fiords, in 5–100 fathoms.

*Eudesia cranium*, Müll. Lang Fiord, 25 fathoms. A single broken specimen.

*Rhynchonella psittacea*, Gmel. Varanger, Lang, and Bog Fiords, in 15–30 fathoms.

Of the Mollusca found in East Finmark the following are not as yet known elsewhere:—

*Philine fragilis.*
*Dendronotus velifer.*
*Bela expansa.*
*Siphonorbis Verkruzeni.*
*Scalaria obtusicostata.*
*Cingula tumidula.*

The following are North American, and not found elsewhere on the Norwegian coast:—

*Liostomia eburnea.*
*Thyasira obesa.*
*Cuspidaria arctica.*

The following are Arctic species which reach East Finmark, but are not known further south on the Norwegian coast:—

*Bela simplex.*
*Siphonorbis lachesis.*
*Alvania Jan-Mayeni.*
*Cingula castanea.*
*Velutella cryptospira.*
*Marsenia grœnlandica.*
*Lunatia nana.*
*Machæroplax varicosa.*
*Turritellopsis acicula.*
*Portlandia intermedia.*
*Cardium ciliatum.*
*Serripes grœnlandicus.*
*Montacuta Maltzani.*
*Cuspidaria glacialis.*
—— *arctica.*

The following species have not been found under more arctic conditions than those existing in East Finmark:—

*Typhlomangelia nivalis.*
*Spirotropis carinata.*
*Taranis cirrata.*
*Odostomia turgida.*
—— *unidentata.*
—— *turrita.*
*Pyrgulina eximia.*
—— *spiralis.*
*Eulima bilineata.*
*Alvania Jeffreysii.*
*Jeffreysia globularis.*
*Marsenia prodita.*
*Gibbula tumida.*
*Pilidium fulvum.*
*Hanleyia debilis.*
*Pecten tigrinus.*
—— *septemradiatus.*
*Limea Sarsi.*
*Modiola phaseolina.*
*Venus gallina.*
—— *fasciata.*
*Lucina borealis.*
*Mactra subtruncata.*
*Corbula gibba.*

A comparison of this list of East Finmark Mollusca with two Norwegian catalogues which I have previously published will illustrate the changes in the Molluscan Fauna as we go further north up the Norwegian coast (see Norman, "Mollusca of the Fiords near Bergen," Journal of Conchology, vol. ii. 1879, p. 8; and "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xii. 1893, p. 341).

[To be continued.]

## L.—*On a new Species of* Paramithrax *from New Zealand.* By GEORGE M. THOMSON, F.L.S.

[Plates VII. & VIII.]

IN the course of a trawling-cruise round the coasts of this colony undertaken by the Marine Department numerous trials of the inshore fishing-grounds were made by Mr. Ayson, Inspector of Fisheries, in the small chartered steamer the 'Doto.' In the course of one of these trials off Cape Saunders a number of specimens of the fine new crab described in this paper were obtained at a depth of about 50 fathoms and at a distance of some 10 miles off shore. It is rather remarkable that, though trawling has been carried on for a year or two now, the same species should not, so far as I am aware, have been met with again. There are no doubt periods of seasonal migrations even of such slow-moving creatures as crabs, for on a more recent occasion, but only once, the trawl brought up a great many specimens of *Prionorhynchus Edwardsii*, a remarkably large species originally known only from the Auckland and Campbell Islands.

The genus *Paramithrax* is represented in New Zealand by four species. Of these the three formerly described species, *P. Peronii*, M.-Edw., *P. minor*, Filhol, and *P. Latreilli*, Miers, are found along the coasts of both islands from between tide-marks to a depth of 20 fathoms. They are smaller than the species described here as *P. longipes*, and differ not only in the length of their legs, but in having the external maxillipeds smooth externally, so that the various articulations can be easily made out, while in the new species these appendages are buried in a dense mass of felted hairs.

The following is a description of the species:—

### *Paramithrax longipes*, sp. n.
### (Pls. VII. & VIII.)

Carapace almost smooth. Spines of the rostrum not divergent. Branchial regions with four submarginal spines. Basal joint of external antennæ nearly square above, its inner margin bearing a ridge which ends in a blunt tubercle. External maxillipeds buried in thick hairs, except a central white knob. Carpus of chelipeds tubercled, but without ridges; fingers smooth internally.

*Male.*—Carapace ovoid, rather convex, with a somewhat pronounced dorsal ridge; surface covered with scattered tubercles, rising occasionally on the median line into blunt spines, destitute of hairs.

The rostrum is produced into two long acute spines, the intermediate space being filled with short hooked hairs.

The hepatic region rises into a prominent pointed tubercle at a short distance from the margin.

The four submarginal spines on the branchial region are placed at a considerable distance from each other, the last well up on the dorsal surface. A ridge with a few tubercles passes obliquely forwards across the front of the branchial region, while in the middle of the same, a little distance to each side of the median line of the carapace, there rises a prominent spinose tubercle.

The sternal plate is deeply hollowed out between the bases of the chelipeds and is transversely ridged opposite each ambulatory leg. The abdomen is 6-jointed; the first joint is very narrow, the next much wider, the rest contracting to the extremity.

The basal joint of the external antennæ is broad, nearly square above, its outer margin somewhat curved and ending in a rounded knob, while its inner margin is produced into a strong ridge standing almost at right angles to the joint and running out into a distinct spine. The flagellum reaches slightly beyond the spines of the rostrum.

The *external maxillipeds* are so thickly covered with felted hairs that only the line of junction of their second and third joints is seen, and this stands out as a tumid white projection. The inner half of the second joint is produced upwards and the outer half of the third joint downwards, the whole forming a closely-locked articulation.

The *chelipeds* are shorter than the first pair of ambulatory legs; the meros bears a few spinose tubercles on the outside and one acute tooth at its widened extremity between the prominent joint tubercles; the carpus has several tubercles on the outer surface, but is not ridged; the hand is quite smooth, externally slightly concave, on the inner side produced into a broad median elevation, above which is a long blood-red patch, all the rest of the joint being white; fingers acute at their extremities, smooth internally.

The *ambulatory legs* are very long, slender, and smooth; the meros of the first pair as long as the two succeeding joints; the dactyla cylindrical, slender, rugose towards the extremities and ending in smooth yellowish-brown claws.

In *colour* the carapace and legs are whitish grey, with blood-red spots; the hands also have a characteristic blood-red patch on the upper inner side.

*Female.*—The body is smaller in every way, the chelipeds are very much shorter than the first pair of ambulatory feet and are very slender.

### *Dimensions in millimetres.*

| | ♂. | ♀. |
|---|---|---|
| Length of carapace | 70 | 55 |
| Breadth of carapace | 62 | 40 |
| Length of cheliped | 110 | 48 |
| ,, hand of same | 45 | 21 |
| ,, first ambulatory leg | 160 | 73 |

When the chelipeds of the male are extended the distance between their tips is 215 millim., between the tips of the first ambulatory legs 300 millim.

## EXPLANATION OF THE PLATES.

Plate VII. *Paramithrax longipes,* G. M. Thomson. ♂, front view.
Plate VIII. The same, dorsal view.

## LI.—*A Contribution to the Systematics of Scorpions.*
By R. I. Pocock.

### I.—Some Corrections in Nomenclature.

The genus *Ischnurus* was first published in 1837 in 'Uebersicht des Arachnidensyst.,' pt. 1, p. 37, and based upon the species described as *I. complanatus*, the only species cited under it. *I. complanatus*, therefore, is the type of *Ischnurus*; and since *complanatus* is congeneric with the type species of *Hormurus*, that genus falls as a synonym of *Ischnurus*.

In his monograph on Scorpions (Das Tierr., Scorpiones, p. 153, 1899) Kraepelin falls into the error of dating *Ischnurus* from 1838, when Koch described under it three species—namely, *I. ochropus*, *I. australasiæ*, and *I. complanatus*; and since Thorell had eliminated the last two under *Hormurus*, Kraepelin assigned the remaining species *ochropus* to *Ischnurus*. This method of dealing was based upon the mistake in the date of publication of *Ischnurus*. The latter must take *complanatus* and *australasiæ*, leaving *ochropus* available for the name *Chiromachus*, which I proposed for it in 1893 (Ann. & Mag. Nat. Hist. (6) xii. p. 320).

These conclusions may be briefly tabulated as follows:—

1. *Ischnurus*, C. L. Koch, Uebers. Arachnidensyst. i. p. 37, pl. vi. fig. 69 (1837) (type *complanatus*).

Syn. *Sisyphus*, id. ib. on pl. vi. fig. 69 (errore for *Ischnurus*).
*Ischnurus* (in part only), C. L. Koch, 1838.
*Hormurus*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 14 (1876) (type *H. caudicula*, L. Koch).
Not syn. *Ischnurus*, Thorell, Karsch, Pocock, and Kraepelin.

2. *Chiromachus*, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 320 (1893) (type *ochropus*, C. Koch).

Syn. *Ischnurus*, C. Koch, Die Arachn. iv. p. 69 (1838) (in part.); Kraep. Jahrb. Hamb. Wiss. Anst. xi. p. 130 (1894); id. Das Tierr., Scorp. &c. p. 153 (1899).
Not syn. *Ischnurus*, C. Koch, 1837.

The name *Centrurus*, which, since 1876, has been applied by common consent to a well-known American genus of Buthidæ, was originally projected into literature in 1828 by Hemprich and Ehrenberg as a *nomen nudum*, no species being cited as referable to it (Symb. Phys., Scorpiones, 1828; Verh. nat. Fr. Berlin, 1829, p. 350; Férussac, Bull. Sci. Nat. xviii. p. 304, 1829). It is true that Ehrenberg appears to have labelled certain specimens in the Berlin Museum with the name *Centrurus*; but this action does not establish its right to recognition. The first author to introduce the name in the orthodox and accepted fashion into systematic zoology was C. Koch, who, in 1838 (Die Arachn. iv. p. 110), assigned it to a scorpion described as *Centrurus galbineus*, which was alleged by Karsch to be based upon the young of a species belonging to a genus inhabiting the Oriental Region and afterwards named *Palamnæus* by Thorell. Gervais rightly accepted Koch's application of the name *Centrurus*. Peters, on the contrary, finding Ehrenberg's labelled specimens, used *Centrurus* for the species exemplified by them, discarding *Isometrus* as a synonym, in spite of its far greater claims for admittance. If C. Koch had not previously taken up the name *Centrurus*, Peters's application of it might have been accepted, and strong reasons could have been advanced for following Thorell when, in 1876, he used *Centrurus* in a restricted sense for the genus diagnosed by himself and typified by *Scorpio gracilis* of Latr. (=*biaculeatus*, Luc.). But since the name had no recognized status until Koch introduced it, I see no escape from the conclusion that it must date from 1838 and be regarded as assignable to the genus typified by the species described by Koch as *Centrurus galbineus*.

For the genus *Centrurus*, as diagnosed by Thorell, I adopt the name *Centruroides*, which, although without a diagnosis, was given by Marx to one of the species, namely *C. exilicauda*, Wood. This species, therefore, is the type of the genus in question. It has not been described since 1863, and its generic position was unknown to Kraepelin when preparing his monograph of the scorpions in the 'Tierreich,' in spite of Marx's publication on the subject.

Its characters and synonymy are given below (see p. 376).

## II.—NOTES ON SOME SPECIES OF *PARABUTHUS* CONTAINED IN THE BRITISH MUSEUM.

1. *Parabuthus planicauda*, Poc. (Ann. & Mag. Nat. Hist. (6) iii. p. 344, pl. xv. fig. 5, 1889).—The type of *P. planicauda*, Poc. (*i. e.* the female specimen measured and described in the original description), is specifically identical with the South-African form to which Purcell has recently restricted the name *capensis* of Hempr. & Ehrenb. The evidence that these two names are synonyms, however, is very far from conclusive. In fact, all the data upon which I can lay hands point rather to the opinion that Purcell has redescribed

*capensis* as *neglectus*. The facts that lead me to this view are briefly these:—

(1) It is, perhaps, more likely than not that the types of *capensis* in the Berlin Museum came from German rather than from British territory in South Africa. *P. neglectus* inhabits German S.W. Africa, *P. planicauda* does not.

(2) Ehrenberg described at the same time as he described *capensis* a species named *granulatus*, which is known to occur in German S.W. Africa, where it exists alongside of *P. neglectus*. The idea that the types of the two were collected together at once suggests itself.

(3) In Keyserling's collection in the British Museum there are a couple of specimens (♂ ♀) ticketed "Cap b. espér." and labelled "*Prionurus capensis*, Ehrb.," which, from certain internal evidence, I have reasons to believe were identified by Dr. Karsch, who had access to Ehrenberg's types for comparison. These specimens are referable to *P. neglectus*, not to *P. planicauda*.

(4) Kraepelin describes the male of *P. capensis* as having wide hands. This is true of *P. neglectus*, not of *P. planicauda*. Kraepelin also had access to Ehrenberg's type.

In view of these considerations it would be a mistake to cite *planicauda* as a synonym of *capensis* until the stronger claims of *neglectus* for such a fate have been further entertained.

The British Museum has specimens of this species from Port Elizabeth (*H. A. Spencer, I. L. Drège, J. M. Leslie*), Grahamstown (*Schönland*), Tea Fountain, near Grahamstown, and Jansenville (*Miss Leppan*).

*P. capensis*, subsp. *Frenchi*, Purc.

The British Museum has specimens of this subspecies from Burghersdorp (*Miss Leppan*).

2. *Parabuthus neglectus*, Purcell (=*P. planicauda*, Poc., in part. Male specimen, ticketed "W. Africa," of original description).

The Museum is badly off for this species, possessing only the two males ticketed "W. Africa" that were originally referred to *planicauda*, the male and female mentioned above as belonging to Keyserling's collection, one ticketed "Cape of Good Hope" ('*Challenger*'), and one from Garies in Namaqualand (*Dr. R. Broom*).

3. *Parabuthus granulatus,* Hempr. & Ehrenb.

The British Museum has specimens from Benguela (*Monteiro*), Port Nolloth and Garies (*Dr. R. Broom*), Pearston (*Dr. Broom*), Jansenville (*Miss Leppan*), Hopefield, Graaf Reinet.

*P. granulatus,* subsp. *fuscus,* Poc.

Kalahari Desert (*R. Cunningham*).

The British East-African species *P. pallidus,* Poc., of which the Museum possesses examples from Mombasa, Giriama, and Taru, differs entirely from *P. granulatus* in the completion of the median lateral keel on the fourth caudal segment, the small hands of the male, the enlarged basal pectinal lobe in the female, &c.

4. *Parabuthus flavidus,* Poc. (Ann. & Mag. Nat. Hist. (7) iii. p, 419, 1899).

According to Purcell's table of the South-African species of *Parabuthus, P. flavidus* falls alongside *P. Schlechteri* from Bechuanaland, which is unknown to me; but the two seem to be at least separable as follows:—

*a.* Upper surface of second caudal segment with a moderately large oval shagreened excavation occupying its anterior half, the posterior half mesially grooved and smooth; shagreen fine, not squamiform; pectinal teeth in male from 46–51 .............................. *Schlechteri.*
*b.* Upper surface of second caudal segment evenly channelled throughout, the entire channel covered with coarse, mostly squamiform shagreen; pectinal teeth 36–37 in male .............................. *flavidus.*

The type and hitherto only recorded individual of this species is a subadult example from Taungs in Bechuanaland (*H. A. Spencer*). A much larger specimen collected by Mr. R. Cunningham in the Kalahari Desert gives the following measurements in millimetres:—

Total length 77; carapace 8·5; tail 48; width of first segment 6, of fourth 7; width of brachium 3, of hand 4·2; length of movable finger 7.

5. *Parabuthus cristatus,* Poc. (Ann. & Mag. Nat. Hist. (7) vii. p. 284, 1901), from the Congo, differs from *P. brevimanus* as described by Purcell in having the sides and lower surface of caudal segments 1–3 smooth, and not "densely and finely granular." Moreover, the four inferior keels of

the first are strong and smooth, not "granular" and "rather weak." The shagreened area of the first and second segments is not flanked by an oblique row of granules, giving them a broadly cuneate appearance. It is noticeable, moreover, that Purcell makes no mention of the strong lobate inferior crest running along the fore margin of the lower side of the fourth caudal segment and abutting against and as high as the U-shaped crest on the third—a feature which has no parallel in other species of the genus. Yet, since Purcell states that the description of *P. cristatus* mentions no structural character to distinguish that species from *brevimanus*, I can only conclude that the characteristic in question is present in *brevimanus*. If so, it is not a little singular that neither Thorell (who "minutely describes both sexes of *brevimanus*"), Purcell (who devotes nearly three pages to the species, mentioning all the less important details), nor Kraepelin say a word to justify the belief in its existence.

## III.—DESCRIPTIONS OF SOME NEW AND OLD SPECIES.

### Family **Scorpionidæ**.

### Genus PANDINUS, Thorell.

### *Pandinus Percivali*, sp. n.

♀.—*Colour* a tolerably uniform yellowish brown, the terga anteriorly darker, fingers darker; a brown spot at the distal extremity of the femur, patella, and protarsus of the leg.

*Carapace* densely and closely punctured; the interocular triangle and the area at the sides of and behind the median eyes smooth; some coarse punctures on the frontal lobes, and a few granules in front of the ocular tubercle; studded at the sides with coarse but not close-set granules; about as long as the first and the second and one third of the third caudal segments, and a little longer than the third and fourth segments.

*Terga* smooth, polished and punctured, except at the sides and along the posterior border, where, except in the middle line, there are many coarse granules; the last with the lateral crests weak, granular, the area between the admedian pair quite smooth.

*Sterna* quite smooth, punctulate, the last obsoletely crested.

*Tail* about three times as long as carapace, slender; fourth segment about twice as long as wide, third considerably less than that, fifth almost three times as long as wide; the superior and superior lateral keels denticulated; the inferior and inferior laterals smooth, except on the fourth, where they are weakly denticulated or crenate, and on the fifth, where they are distinctly denticulated; intercarinal spaces smooth; vesicle much wider than high, as wide as the third caudal segment, serially granular below and laterally.

*Chelæ*: humerus with superior and anterior denticulate crests, a few scattered coarse granules on the upperside; the lower side with a series, sometimes partially double, of coarse granules along the posterior border; lower side of brachium with three rows of setal pores posteriorly, the anterior crest of the lower side denticulate, the posterior smooth, the anterior surface minutely granular, with one large denticle, the posterior surface pitted with coarse punctures, but smooth; the superior crest crenate; hand very wide, its width equal to the median length of the carapace and a little shorter than the movable finger, its upperside punctulated, smooth, with a sculpturing of low smooth anastomosing ridges, nearly obsolete in the middle, but becoming coarser and more tubercular towards the inner edge and externally above the smooth keel of the underhand; inner edge of hand widely rounded, not much produced posteriorly, and strongly dentate in the middle, the denticles becoming smaller towards the base of the immovable finger and posteriorly, the whole of the posterior border of the lobe smooth; underside of the hand with a few scattered denticles and a pair of weakly denticulated keels; no large tooth on the fingers.

*Legs* with two external protarsal spines on the first and second, one apical on the third, and none on the fourth; tarsal lobes armed with four spines, one of which is apical, the total number of spines on the tarsi being five in front and seven or eight behind, the larger number being upon the third and fourth legs.

*Pectinal teeth* 21–22.

*Measurements in millimetres.*—Total length 98; carapace 17; tail 53; width of hand 15, length of underhand 9·8, of movable finger 16.

*Loc.* Al-khaur, in the Abian country, 80 miles east of Aden, in Arabia. Collected by Mr. A. B. Percival.

Apparently most nearly resembling the Somaliland species *P. meidensis* of Karsch in the sculpturing and crests on the upperside of the hand and the presence of only a small number of granules on the posterior underside of the humerus; but in *meidensis* there are four rows of setal pores on the underside of the brachium and two more spines, one on each side, upon the tarsi of the legs. The other Arabian species, *P. arabicus* of Kraepelin (Jahrb. Hamb. Wiss. Anst.

xi. p. 58, 1894; id. Das Tierr., Scorpiones &c. p. 120, 1899), described from Homran, differs from *P. Percivali* in the thick and coarse granulation of the underside of the humerus of the chela and in having only three instead of four spines on the tarsal lobes, only two keels on the upperside of the hand, &c.

### Genus Urodacus, Peters.

#### *Urodacus spinatus*, sp. n.

♂.—Allied to *U. hoplurus*, Poc. (Ann. & Mag. Nat. Hist. (7) ii. p. 64, 1898), from Lawlers, Western Australia, but differing in the following features:—

The frontal portion of the *carapace* is smooth, polished, and finely punctured, not tubercular; its median area bearing the eyes is not elevated. The two granular crests on each side of the last abdominal *tergite* extend well past the middle of the plate, the external reaching further than the internal; in *U. hoplurus* the external barely reaches the middle, the internal falls far short of it.

*Tail* longer and thinner than in *U. hoplurus*, almost six times as long as the carapace, which is as long as its first segment + $\frac{1}{4}$ of the second or as the fourth; first segment about twice as long as wide, the fourth four times as long as wide; superior keels of segments 1–4 weakly denticulated and terminating in a high, erect, triangular spike like that of *U. hoplurus*; inferior keels of the fourth distinctly but weakly denticulated; in *U. hoplurus* these keels are smooth; vesicle weakly and sparsely granular, as wide as the second caudal segment, wider than the fifth, its height about equal to the width of the fourth.

*Chelæ* much flatter than in *U. hoplurus*, the upperside of the brachium defined behind by a keel; the keel on the hand stronger than in *U. hoplurus*, the height of the outer surface of the hand equal to about half its length along the keel of the underhand; inferior pores on brachium and hand as in *U. hoplurus*; movable finger about as long as carapace.

Five posterior protarsal spines on first *leg*, six on second and third legs; in *U. hoplurus* there are five of these spines on the first and second legs and four on the third leg.

*Pectinal teeth* 20–21.

*Measurements in millimetres.*—Total length 93; carapace 10; tail 68; length of first segment of tail 7·5, length of fifth segment 15; width of vesicle 3·5; height of hand 5; length of underhand 8; width of hand 6·3.

*Loc.* Queensland · Cape York Promontory.

### *Urodacus subarmatus*, sp. n.

♀.—*Colour* a tolerably uniform yellowish brown.

*Carapace* as long as the caudal segments 1+2 or 3+4, rather longer than the fifth; anteocular area smooth except for some weak tubercles behind the anterior margin, the margin obliquely truncate, with a shallow median notch; the ridges of the ocular tubercle continued in front halfway across the anteocular area, and continuous behind with the ridges bounding the posterior triangular impression.

*Terga* very finely granular at the sides; the internal granular keels of the last extending to the middle of the plate, the external surpassing the middle; last sternal plate with two conspicuous smooth keels.

*Tail* short, about four times as long as the carapace, moderately robust, first segment about as wide as long, the fifth a little more than twice as long as wide, wider than the fourth and almost as wide as the second; superior keels of segments 1–4 ending behind in a triangular spike, the anterior border, however, of which is in the same straight line as the granular superior crest; supero-lateral crest also sharply granular; inferior crests smooth, those of the fourth at most weakly granular; fifth segment with denticulated keels, its lower surface somewhat thickly granular between the keels, the median of which consists of two rows of granuliform denticulations; sides and, to a lesser extent, the upper surface of the segment granular; vesicle thickly but finely granular, as wide as the fifth caudal segment.

*Chelæ* with humerus weakly granular above; brachium smooth, except the crests that border its anterior surface above and below, the lower surface bordered behind by a smooth crest, in front of which there is a row of eleven pores; hand smooth all over, except for a few granules on its upper inner edge, thick, convex above, and furnished with two fairly strong finger-keels, and a row of about eleven pores beneath on the inner side of the keel of the underhand, and about twelve irregularly arranged above it; movable finger furnished throughout three fourths of its length with three closely packed rows of squamiform teeth, and in the distal fourth with a single median row, flanked on the inner side with about four short transverse rows of three teeth each and on the outer side with about four pairs of transversely set teeth.

Protarsus of first and second *legs* with six (rarely five) long, slender, subequal spines, that of the third with five, that of the fourth with four.

*Pectinal teeth* 17.

*Measurements in millimetres.*—Total length 62; carapace 9; tail 36, length of its first segment 4, of its fifth 8·6; width of hand 6·5, height 4·8; length of underhand 7·5, of finger 9·5.

*Loc.* Queensland: Cape York Promontory.

In many respects the type of this species resembles that of *U. armatus*, Poc., which was from Port Lincoln in South Australia. If the two had come from the same locality, I should have been inclined to regard them as sexes of one and the same species, in spite of the fact that the superior lateral keels of the first four caudal segments are smooth or nearly so in *U. armatus* and sharply granular in *U. subarmatus*. This structural character, coupled with the difference in distribution, completely justifies the view of the specific distinctness of the two forms.

Kraepelin's statements (Das Tierr., Scorpiones, p. 103, 1899), that *U. armatus* and *U. hoplurus* are characterized by the presence of a single row of teeth extending nearly throughout the length of the movable finger of the chela, that the last abdominal sternum is without conspicuous keels, and that the underside of the brachium is also keelless, have no foundation in fact.

### *Urodacus simplex*, sp. n.

♂.—*Colour* a uniform yellowish brown.

*Carapace* with squarely truncate anterior border and deep median angular notch, with a small triangular sclerite in the middle; anteocular area smooth, very finely punctured, with a few granules in front; lateral portions of carapace shagreened; ocular ridges not continuous behind with the ridges bordering the posterior impression.

*Terga* finely and closely granular, smoother in the middle; the last with only a small number of larger granules marking the lateral keels, which are so prominent in most other species.

*Tail* about four times as long as the carapace, which is a little shorter than segments 1 + 2 or 3 + 4 and only a little longer than 5; sides of segments lightly convex; segments 1–4 smooth except for a few lateral granules; inferior keels smooth, superior and superior lateral keels granular or subdenticulated, the former a little elevated posteriorly; fifth segment with granular intercarinal spaces; the inferior median keel double.

*Chelæ* with brachium distinctly though finely granular above, smooth externally, with ten or eleven inferior setal pores; upperside of hand flat, with inner finger-keel nearly obsolete, the height of its outer side almost half its length; a row of fifteen or sixteen pores on its underside; fingers armed with a single median row of teeth and a single series of spaced teeth on each side of it, short, the movable considerably shorter than the carapace.

*Legs* with six protarsal spines on the first, five on the second and third.

*Pectinal teeth* 16.

*Measurements in millimetres.*—Total length 46; length of carapace 6·3, of tail 27, of first + second caudal segment 7·5, of the fifth 6·5; width of hand 4·6, height 3·2; length of underhand 5·5, of movable finger 5·5.

*Loc.* Queensland: Cape York Promontory.

Distinguishable from all the species known to me by the simple dentition of digits of the chelæ &c.

## Family **Buthidæ.**

### Genus Buthus, Leach.

### *Buthus mauritanicus*, sp. n.

*Colour* blackish brown all over, like *B. bicolor* and *æneas*, with hand redder and tarsi pale; a pale stripe on the first, second, and third sterna.

Allied to *B. crassicauda*, Olivier, from Persia and Asiatic Turkey, but with the carapace and terga more coarsely granular and with more coarsely granular keels; the keels on the last abdominal sternum and lower side of first caudal segment smoother.

*Tail* keeled and with its intercarinal spaces smooth, as in *B. crassicauda*, but relatively thicker; third and fourth segments the widest of the series, the fourth as wide as long, inferior lateral keel of fifth with one large lobate tooth in front of the trilobate terminal lobe, from which it is separated by a space containing from one to three smaller teeth. In *B. crassicauda* there are about three subequal large teeth and often no distinct interval between them and the terminal lobe.

*Chelæ* with the hand incrassate in both sexes, that of the male large, much wider than the brachium, the movable digit only lightly sinuate, the immovable with a deep basal notch and large lobate prominence.

*Pectinal teeth* about 28 in both sexes.

*Measurements in millimetres.*—♂. Total length 69; length of carapace 8, of tail 42, width of its third segment 7, length 6·5; width of brachium 3, of hand 4; length of movable finger 9.

*Loc.* Morocco (adult males and females collected by Mr. F. G. Aflalo and received from the Zoological Society of London); Tangiers (*F. W. Frohawk*); Mehedija, at the mouth of the Sebu River (*E. G. B. Meade-Waldo*).

The largest example of this species I have seen is a male, measuring 75 millim., taken by Mr. Meade-Waldo.

This scorpion has probably been confounded hitherto with one or the other of the black species of *Buthus* which occur on the shores of the Mediterranean, and which have been until lately confounded as one species under the name *crassicauda*. In Journ. Linn. Soc., Zool. xxv. p. 308, I pointed out that the Egyptian black scorpion, *B. bicolor*, is quite distinct from the Persian and Syrian form, *B. crassicauda*. This opinion was adopted by Kraepelin in Das Tierr., Scorpiones, p. 17 (1899). But under the synonymy of *bicolor* appears the name *æneas*, which was given by C. Koch to an Algerian species. The British Museum, however, possesses black scorpions from Algeria and Tunisia which must be referred to *æneas*, and these I find to be specifically distinct from the Egyptian *B. bicolor*. The references and synonyms of *B. æneas* are as follows:—

*Androctonus æneas*, C. Koch, Die Arachn. vi. p. 3, fig. 432 (1839) (♀); id. in Wagner's Reisen in Algier, iii. p. 218, Atl. pl. x. (1841) (♀).

*Androctonus bicolor*, Lucas, Expl. de l'Algérie, Zool. i. p. 271, Atl. pl. xviii. (1849) (♂).

Both *B. bicolor* and *B. æneas* differ from *B. crassicauda* and *B. mauritanicus* in having the middle of the upperside of the last abdominal tergum and of the first caudal segment and to a lesser extent of the second finely and closely granular, the granular area perhaps constituting a stridulating-organ such as is found in the genus *Parabuthus* (see P. Z. S. 1892, p. 222). The Egyptian form, *B. bicolor*, may be distinguished from the Algerian *B. æneas* by having the median lateral keel strong and almost complete anteriorly upon the second and third caudal segments, and the hand in both male and female not wider than the brachium and of equal width in both sexes; whereas in *B. æneas*, to judge from the small number of specimens in the British Museum from Tunis and Algeria that I refer to this species, the hand of the adult male is longer as compared with the movable finger and thicker than the brachium, and the median lateral keel is weaker on the second caudal segment and almost absent on the third.

There is still, however, much to learn regarding the black forms of *Buthus* allied to *B. australis* and *B. bicolor*, and it may ultimately prove that *B. crassicauda* and *B. mauritanicus* are melanistic subspecies of the former.

Thorell (Bull. Soc. Ent. Ital. xxv. p. 357, 1894) has already recorded from Tunis two examples, referred to *B. australis*, which differ from the typical form only in being entirely olive-green in colour.

## Genus CENTRUROIDES, Marx.

### *Centruroides Hasethi*, sp. n.

Syn. *Centrurus granosus*+*Bertholdi*, Thor., Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 90 (1899) (nec *Centrurus granosus*, Thor.; nec *C. Bertholdi*, Thor.).

In the 'Biologia Centrali-Americana,' Arachn. Scorp. pp. 27–28, I have pointed out that the male of the scorpion from Curaçoa identified by Kraepelin as *C. Bertholdi*, Thorell, which was considered to be the male of *C. granosus*, Thor., differs from *C. Bertholdi* in having no subaculear tooth upon the vesicle, the carapace longer than the first caudal segment, than half the length of the sum of the first and second, and more than one seventh the length of the tail, and in the smoothness of the upper keels of the hand; and on p. 32 I have given reasons for regarding *C. granosus* of Thorell as based upon a small specimen of *C. margaritatus*, and have pointed out that the female of the species from Curaçoa which Kraepelin referred to *C. granosus* differs from that species in colour and in having no subaculear tooth upon the vesicle.

The type (♂) of this new species and a female, both received in exchange from Dr. Kraepelin of the Hamburg Museum, were collected in the island of Curaçoa.

Their measurements in millimetres are as follows:—
♂. Total length 66; length of carapace 6; of tail 44, of its first segment 5·5, second segment 6·5, fifth segment 8; width of brachium 2, of hand 3; length of underhand 4·7, of movable finger 7.

♀. Total length 71; carapace 7; tail 43, its first segment 5, second segment 6·3, fifth 8·3.

For the sake of comparison I subjoin some of the measurements of *C. Bertholdi*, as given by Thorell:—Total length 79·5; carapace 6·5; tail 51·5, its first segment 7, second 8·5, fifth 10·3.

These dimensions speak for themselves when compared with those of the male of *C. Hasethi*.

### *Centruroides exilicauda* (Wood).

*Buthus exilicauda*, Wood, Proc. Ac. Philad. 1863, p. 107; id. Journ. Ac. Philad. v. p. 366 (1863).
*Centrurus exilicauda*, Marx, P. Ent. Soc. Wash. p. 91 (1888).
*Centruroides exilicauda*, id. Proc. U.S. Mus. 1889, p. 211.

♀.—Of about the same size and coloration as *C. subgranosus*, Kr., being uniformly ochraceous with exception of the eyes, which are black; no distinct dorsal black bands, merely an indication of a slightly paler median and lateral spot on the terga; a faintly defined dark band on lower side of tail.

Upperside of *trunk* and surfaces of *tail* noticeably more coarsely and closely granular than in *C. subgranosus*; the last abdominal sternum closely granular throughout, the four keels distinctly granular and closer to each other than in that species, the fourth with traces of a pair of keels; also short lateral keels present on the terga.

*Tail* longer and much thinner than in *C. subgranosus*, about six times as long as carapace, as long as the third segment of the tail, the latter twice as long as wide, fifth segment about three times as long as wide; vesicle smooth, more globular, not granular, and with no subaculear tooth, only the minutest trace discernible. (In *C. subgranosus* the third caudal segment is distinctly less than twice as long as wide and the fifth is only twice and a half as long as wide; the vesicle is granular.)

*Chelæ* and *legs* more granular than in *C. subgranosus*, all the crests on the hand stronger and more distinctly granular, that of the underhand granular. Movable finger with stronger lobe. Coxæ of legs finely granular, especially along their anterior edges.

*Pectinal teeth* 19.

*Measurements in millimetres.*—Total length 48; carapace 4·5; tail 29, length of fifth segment 5·2, width 1·7,

*Loc.* Lower California: San José del Cabo (in Mus. Brit.).

The above-described specimen appears to belong to the species from Lower California named *Buthus exilicauda* by Wood, which was referred by Marx to the genus *Centrurus*, and was subsequently made by this author the type of the uncharacterized genus *Centruroides* and recorded from St. Margaret's Island. According to Wood, the species attains a length of 45 millim. (20–21 lines), has 18 pectinal teeth, very small hands, and no subaculear tooth. The colour is said to be "dilute aurantiaco-brunneus, interdum obscure maculatus," with generally an inferior stripe on the tail, apparently such as is seen in the Texan examples of *C. vittatus* in the British Museum.

The species also resembles the preceding, *C. Hasethi*, Pocock, from Curaçoa, in the absence of the subaculear tooth, but differs in having the crests on the hands studded with pearly granulation, the smaller number of pectinal teeth, the smooth and more globular vesicle, &c.

### Genus RHOPALURUS, Thor.

### *Rhopalurus Borellii*, sp. n.

*Heteroctenus agamemnon*, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 393 (1893). Nec *Tityus agamemnon*, C. Koch, Die Arachn. vi. p. 103, fig. 506; and Kraepelin, Das Tierr., Scorpiones &c. p. 94 (1899) (*Centrurus*).

♀.—*Colour.* Upperside of trunk a nearly uniform yellowish brown, the frontal area of the carapace infuscate; tail yellow, with exception of the fourth and fifth segments, the latter deep blackish brown throughout, the former blackish posteriorly, more deeply and extensively so beneath and laterally than above; inferior median keels of third segment sometimes infuscate; chelæ with humerus and brachium clear yellow, hands strongly infuscate, but not so dark as the fingers, which are black, with the extreme apex yellow; mandibles distally infuscate; legs and sterna uniformly pale yellow.

*Carapace* coarsely granular, the granules subserially arranged laterally, as long as the first $+\frac{1}{2}$ the second or as the fifth caudal segment.

*Terga* coarsely granular, without lateral crests.

*Sterna* for the most part smooth, but the depressed area on each side of the first finely and closely granular throughout as far back as the stigma, the median triangular area perfectly smooth and sparsely punctured, last sternum granular throughout and with four granular crests.

*Tail* thick and strong, more than five times as long as the carapace; fourth segment as wide as long, fourth and fifth a little wider than first, the former about one fourth, the latter about one third longer than wide; upperside of tail weakly granular, sides and lower surface thickly and coarsely granular, especially on the posterior segments; the keels coarsely granular, the superior subdenticulate posteriorly, upperside of fourth and fifth segments excavated, with upstanding keels; the median lateral keel strong on the second and quite distinct on the third segment, and just detectable on the fourth; vesicle weakly granular, wider than high, a little wider than the hand or the brachium; an acute subaculear tooth about twice its basal diameter from the aculeus.

*Chelæ* very finely granular above, with coarsely and evenly granular crests; hand narrow, as wide as brachium, its width two thirds the length of the underhand, which is less than half that of the movable finger; upper surface of hand shagreened, with feebly granular but conspicuous finger-keels; movable finger longer than fifth caudal segment, weakly lobate, with eight rows of teeth.

*Legs* weakly granular, with granular crests.

*Pectines* strongly expanded at base, as in *R. junceus,* with 19–20 teeth.

♂.—*Tail* a little longer than in female, nearly six times as long as carapace, the latter as long as the first + ¼ of the second and slightly shorter than the fifth segment, fourth segment about one fourth longer than wide.

*Hand* smooth, not crested, much wider than brachium, its width nearly equal to the length of the underhand, which exceeds half the length of the movable finger, the two fingers separated by a narrow ~-shaped space.

*Pectinal teeth* 24–25.

*Measurements in millimetres.*—♀. Total length 75; carapace 8·5; tail 44, width of first segment 5, of fourth 5·5, of brachium 2·5, of hand 2·8; length of underhand 4, of movable finger 10.

♂. Total length 77; carapace 8·5; tail 47, width of first segment 5·5, of fourth 6·5, of brachium 2·5, of hand 4·2; length of underhand 5, of movable finger 9.

*Loc.* Brazil (in Mus. Brit.).

I formerly supposed the specimens here described to be referable to *Tityus agamemnon* of C. Koch; but according to Kraepelin, who has presumably examined Koch's types, *T. agamemnon* has only eight keels on the second and third caudal segments, as in *junceus.* Also the median area of the first abdominal sternum is said to be granular. The species, which I have pleasure in dedicating to Dr. Borelli, is most nearly related to *R. laticauda,* Thorell.

## Genus Tityus, C. Koch.

### *Tityus Engelkei,* sp. n.

Allied to *T. pachyurus* and *T. metuendus,* but differing from both in colour as well as in certain structural characters.

Prevailing *colour* yellowish brown, frontal portion of carapace sometimes blackish anteriorly; terga never longitudinally banded and with scarcely a sign of spots; sterna not variegated; tail with its fourth and fifth segments and vesicle strongly infuscate in the adult, the upperside of the fourth paler; chelicerae distally infuscate; legs almost uniformly pale, at most obscurely mottled distally; chelæ pale, with black fingers.

*Fingers* of male widely separated at base.

*Pectinal teeth* 21–23 in male, generally 21 in female.

Movable *finger* with 16 rows of teeth.

*Measurements in millimetres.*—♂. Total length 77; carapace 8; centre of tubercle to posterior border of carapace 4·5; tail 50; width of first segment 4·5, third 5·4, fourth 6; vesicle 3; length of second segment 7·5, of fourth 8·7, of fifth 8·5; width of brachium 3·3, of hand 5; length of movable finger 10·5.

♀. Total length 77; carapace 8; tail 43, width of first segment 4·3, of fifth 4·5, of brachium 3, of hand 3·5.

*Loc.* Onaca, 2200 feet (type), and Chiaca, 1200 feet, in St. Martha in Colombia. Collected by Mr. Charles Engelke.

### *Tityus Kraepelini*, sp. n.

Allied to *T. magnimanus*, Poc., but with the inferior median keels of the third caudal segment not united, merely converging in the posterior third of the segment, those of the fourth confluent in the posterior half of the segment, without, however, forming a definite median longitudinal crest as in *T. magnimanus*, but a series of irregularly disposed granules.

♂.—*Colour* blackish, with the chelæ, excepting the fingers, reddish.

*Tail* a little longer than that of *T. magnimanus*; chelæ much like those of that species, but the fingers much shorter, the movable only as long as the fourth caudal segment, whereas in *T. magnimanus* it is longer than the fifth (9·5 : 8·6).

♀.—Differing from those of *T. magnimanus* and *trinitatis* by the structure of the inferior keels on the third and fourth caudal segments; further differing from *T. trinitatis* in the greater thickness of its tail (*cf.* measurements).

*Measurements in millimetres.*—♂ (type). Total length 62; carapace 6·3; tail 40, width of its fourth segment 3·5, length of third segment 7, of fourth 7·5, of brachium 7·5, of underhand 5·5, of movable finger 7·5; width of hand 3·3.

♀. Total length 62; carapace 6·5; tail 37, width of its first segment 3·6, length of the fourth 6·5, width 4, length of the fifth 7·5, width 4; length of brachium 7, width 3; length of hand 4·5, width 3·5; length of movable finger 8.

*Loc.* Venezuela: Merida (type) and Pedregosa.

In 1898 I received a dried female specimen of this species, ticketed "Merida," from Prof. Kraepelin. The material was, however, not sufficient to base a species upon. Recently the British Museum has acquired examples of both sexes from that locality, as well as one from Pedregosa, which satisfactorily establish the constancy of the characters.

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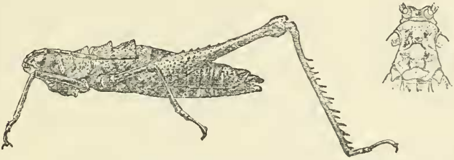
## LII.—*Description of a new Genus and Species of Apterous Locust from Ecuador.* By W. F. KIRBY, F.L.S., F.E.S.

### OPAON, gen. nov.

Head convex above, with a row of granulations running from the occiput nearly to the inner edge of each eye; eyes separated by a space about equal to their width; fastigium depressed, subtriangular, extending between the antennæ nearly to the length of the scape; lower part of face falling away obliquely behind the level of the eyes; antennæ with thirteen joints of the flagellum remaining, which are not unlike those of a Prionide beetle; joints very thick, two or three times as long as broad; pronotum as long as broad behind, where it is somewhat widened, transversely wrinkled, and with two distinct transverse sutures, the first about the middle, the second halfway between this and the extremity; before the middle are one or two shallow ones; hinder edge with a row of large rounded warts. Mesothorax, metathorax, and first segment of abdomen covered with larger and smaller warts, and with an irregular carina, rising into an obtuse projection behind each; the meso- and metathorax contracted in the middle, so as to leave wide interstices between, the centre of which is blackish; prosternal spine broad at base, conical and rather pointed at tip; abdomen contracted in the middle, and transversely wrinkled behind the first segment; legs rather hairy, first two pairs short, front tibiæ with no foramina, femora and tibiæ of about equal length, nearly straight, tibiæ with some short spines towards the extremity beneath; second joint of tarsi distinctly shorter than the first, third considerably longer than both the others together, smooth, widened towards the extremity; arolium* well-marked. Hind femora very long, extending for one fourth of their length beyond the abdomen, straight and rather slender, covered with large raised warts both on the carinæ, which are rather indistinctly marked, and on the surface; the two upper carinæ are close together, and the innermost is set with a row of larger blunt teeth than are visible elsewhere. Hind tibiæ as long as the femora, slightly incurved towards the base, the upper surface with seven or eight strong and nearly straight spines on each side, not symmetrical, but the outer ones placed beyond the level of the inner, almost halfway between; no terminal spine on the outer row.



*Opaon granulosus*, sp. n.

Long. corp. 36 millim.; long. fem. ant. 9 millim.; long. fem. post. 26 millim.

Head, antennæ, and greater part of abdomen black; palpi whitish; thorax, basal segment of abdomen, and hind legs bright red, except a black spot on the side of the first segment of the abdomen, enclosing a large yellow spiracular spot; spines of hind tibiæ black; four front legs and hind tarsi of a lighter red, with the spines and claws black.

One female specimen from Paramba, in Ecuador.

This curious insect will probably require a new family for its reception, when more specimens, representing both sexes, are obtained. In the structure and proportions of the legs &c. it shows some resemblance to *Opomala viridis*, Serv., and I therefore place it provisionally in the neighbourhood of that insect, which, however, is a winged and comparatively smooth species.

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* This word is used by several continental entomologists for the pad between the claws which is present in many insects. It looks like a classical word, but I have been quite unable to trace its derivation from any language with which I am acquainted.

# LIII.—*The Morphology of the Madreporaria.*—III. *The Significance of Budding and Fission.* By J. E. DUERDEN, Ph.D., A.R.C.Sc. (Lond.), Bruce Fellow, Johns Hopkins University.

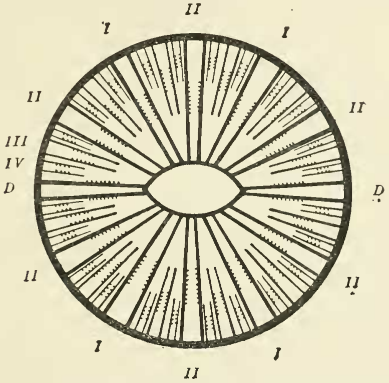
VEGETATIVE or asexual growth is one of the most prominent characteristics of Madreporarian corals; yet, however varied in form the colonies produced thereby may become, the methods of polypal increase can apparently be reduced to two sharply defined processes—namely, budding and fission. Much has been written upon the different types of asexual reproduction in corals so far as they can be studied on the skeleton alone, and for systematic purposes an extensive terminology has arisen in connexion therewith. So far as the polyps are concerned, however, the essential morphological distinction between budding and fission has never been established. A study of a large number of West-Indian representatives of both gemmiferous and fissiparous corals reveals that the two groups are characterized by very important differences. Only the essential results and conclusions will be here presented; the full details upon which they are founded will appear in a memoir upon the general morphology of West-Indian Madreporarian polyps, shortly to be published.

The following genera of colonial corals all reproduce asexually by budding from one region or another of the polypal wall:—*Acropora* (*Madrepora*), *Porites*, *Astrangia*, *Phyllangia*, *Cladocora*, *Orbicella*, *Solenastræa*, *Stephanocœnia*, *Oculina*, and *Siderastræa*. An anatomical examination of numerous decalcified specimens of one or more species of each of the ten genera has been completed, and demonstrates that in every case the individual polyps of a colony are built upon the normal hexactinian cyclical plan. All the polyps possess at least six pairs of primary mesenteries, including two pairs of directives situated at opposite extremities.

Very different stages in mesenterial development are represented by the mature polyps of the different species. In all, with the exception of *Acropora* and *Porites*, the six pairs of primary mesenteries are united with the stomodæum and form a first cycle. In the two genera mentioned only the first four developmental pairs are complete, the fifth and sixth pairs remain permanently free from the stomodæum. Where in other genera additional mesenteries occur the next six pairs are arranged in a cycle alternating with the primary six; in some cases, as in *Phyllangia* and some species of *Orbicella*, the second order mesenteries become united with the stomodæum, but usually they are free. Where a third order of mesenteries is fully developed it consists of twelve pairs, alternating with the twelve pairs which constitute the first and second orders, and by a difference in size is recognizable as a distinct cycle. A fourth order of mesenteries would consist of twenty-four pairs, alternating with all the previous pairs, and a little shorter in radial extent, thus constituting a separate cycle.

The typical condition of a coral polyp with four complete hexameral cycles of mesenteries is diagrammatically represented in fig. 1, but such perfect regularity as is here indicated is rarely exhibited by the later cycles. Further, many polyps, even when mature, do not possess the entire number of mesenteries necessary to complete the last cycle which is begun; yet in every case the sequence, so far as it goes, is regularly cyclical and hexameral.

Fig. 1.



Diagrammatic mesenterial arrangement in a simple polyp of *Manicina areolata* in which four orders of mesenteries (I–IV) are present, arranged in three cycles. D, D, directives. Septal invaginations omitted. The section is placed with the dorso-ventral axis lateral instead of vertical, in order to facilitate comparison with figs. 2 and 3.

The septa in all the representatives of the above genera are arranged in hexameral cycles in close conformity with the mesenteries, a single septum within each entocœle and each exocœle. An order (primary, secondary, tertiary, &c.) of entosepta corresponds with each order of mesenteries, while the members of the last cycle of septa are all exosepta and correspond in number with the total number of entosepta. In *Acropora* the exosepta are frequently wanting.

The tentacles also show a close correspondence with the mesenteries and septa; a single tentacle arises from each mesenterial chamber, and corresponds with a septum below.

The results above summarized are in harmony with those of von Koch, Fowler, Bourne, and von Heider upon the morphology of other coral polyps whose asexual reproduction is by budding. There seems every reason for the assertion that wherever coral polyps arise by gemmation they conform to the hexameral cyclical plan as regards their mesenteries, septa, and tentacles; likewise two pairs of directives which denote the principal axis of the polyp are always present.

The investigations of the late Lacaze-Duthiers (1873, 1897), von Koch (1897), and H. V. Wilson (1888) have made us acquainted with the early larval development of several corals. At the beginning the organs usually arise in bilateral sequence, but in the end are found to exhibit a hexameral plan, and the six primary pairs of mesenteries include two pairs of directives. I have also followed the development of larval polyps (that is, polyps originating directly from sexually produced larvæ as compared with bud-polyps which arise asexually) of *Siderastræa radians* (Pallas) for four months, and the growth of *Favia fragum* (Esper) and *Manicina areolata* (Linn.) less completely. These are likewise characterized by cyclical hexamerism.

As gemmation usually takes place on the column wall, in close association with the mesenteries of the adult, it has not been possible to determine in many cases whether any of the organs of the adult are included in the formation of the bud, or whether the mesenterial pairs arise altogether as new formations from the polypal wall of the parent. The latter is certainly the case in buds of *Acropora*, as I have shown in the paper preceding this (1902), and the very early stage at which the polypal organs are found wholly separated in other forms would seem to imply a similar origin elsewhere.

Investigations have also been carried out upon the early development of buds, more particularly in *Acropora*, *Cladocora*, and *Solenastræa*, and as regards the order of appearance and ultimate arrangement of the organs the sequence followed is in close conformity with that of the larval polyps whose history is known.

Thus all the researches on the asexual reproduction of corals go to prove that polyps arising as buds reproduce all the characteristics of polyps formed directly from larvæ. Excepting the peculiarities dependent upon the colonial state I know of no feature by which bud polyps can be distinguished from larval polyps. The polyps arising on a colony as buds are to all intents and purposes new individuals, as much as polyps reared directly from larvæ.

Another group of West-Indian corals includes such genera as *Favia*, *Dichocœnia*, *Isophyllia*, *Manicina* *, *Mœandrina* *, *Pectinia*, and *Colpophyllia*, all of which reproduce asexually by fission, not by gemmation. The characteristics of these will now be compared with those of the gemmiferous polyps given above.

Numerous decalcified polyps or parts of the polypal system of species belonging to each genus have been studied anatomically, and beyond the early developmental stages all agree in the following features:—(*a*) absence of directive mesenteries; (*b*) absence of any hexameral or other regular cyclical plan. As such studies involve the prolonged process of decalcification and the preparation of numerous microscopic sections, it has not been found possible, except in colonies of *Manicina* and *Favia*, to investigate the entire polypal system of any large colony; but the number of typical regions examined in each species appears sufficient to warrant the summary just made.

The calcareous septa in the genera mentioned confirm the results from the mesenteries as to the absence of any hexameral cyclical regularity. While frequently three or four different sizes of septa may alternate in a manner which suggests so many different cycles, the regularity of the grouping is never continued beyond a very short distance; other septa are intercalated or some are wanting, and thus the apparent normal sequence is destroyed. Of all the species studied the corallites of *Favia fragum* present the nearest approach to individuality, but in scarcely any two of these is the number of septa the same, and there is no suggestion whatever of hexamerism. The septa may present an approximation to a tricyclic condition, but such is never maintained all the way round the corallite †.

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* Verrill (1901, p. 66) has united these two genera along with *Diploria* and *Cœloria* under the genus *Mœandra* of Oken, 1815.

† Where collections of actual specimens are not available the very fine series of photographic reproductions of West-Indian corals in the recent papers of Vaughan (1901) and Verrill (1901) serve sufficiently well to show the essential differences in the characters of the septal systems of gemmiferous and fissiparous corals.

Similar results are given by Bourne (1887) for the genera *Euphyllia* and *Mussa*, and by Fowler (1888) for *Lophohelia*, all of which reproduce by fission *. These authors state that directive mesenteries are absent in the polyps examined by them and that the septa are only irregularly arranged in orders, and are not necessarily a multiple of six.

The special characteristics of the polypal system of fission-corals thus summarized can be fully understood only from a knowledge of the early stages of growth. For this purpose the phenomenon of polypal fission as it occurs in *Manicina areolata* and *Favia fragum* will be briefly described.

The development of the larval polyp of *Manicina* has been followed as far as the establishment of the twelve primary mesenteries, the first two cycles of tentacles, and the appearance of the six primary septa. Adherent to the dead parts of old colonies are frequently found small independent polyps, evidently derived from larvæ which had fixed themselves on the parent colony. From these all the subsequent stages of development, showing two, four, or more oral apertures, have been secured. Thus for purposes of the present study the development of *Manicina* is known from the earliest appearance of the mesenteries until fission has become fully established.

The primary tentacles, mesenteries, and septa of *Manicina* are arranged in regular hexameral cycles. The mesenteries throughout arise in a bilateral order according to a definite sequence, but in the establishment of any cycle the members become equal, as if they had arisen simultaneously. The furthest stage obtained in the growth of a simple unioral polyp is diagrammatically represented in fig. 1. Twelve pairs of mesenteries (I, II), including two pairs of directives (D, D), represent the first and second orders, and extend as far as the stomodæum; alternating with these are twelve other pairs of mesenteries, forming a second cycle and representing the third order (III); alternating with both cycles is a third cycle of twenty-four pairs (IV). The larval polyp is thus built upon the normal hexameral cyclical plan, and at this stage differs in no respects from the polyps which have been previously described as arising by gemmation.

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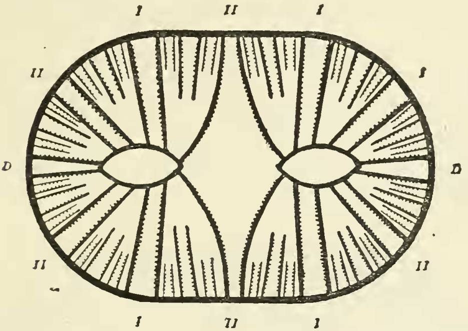
* Lacaze-Duthiers (1897, p. 154) shows that in *Lophohelia proliferum* a portion of an older calice takes part in the formation of a bud (blastozöite). As here understood, this would be regarded as an instance of fission in which the two parts become almost wholly separated, and Lacaze-Duthiers apparently regarded it as such. In connexion with the differences between gemmiferous and fissiparous corals, in species where the polyps become almost wholly distinct from one another, the hexameral cyclical regularity of the septal plan in the gemmiferous *Amphihelia* and its irregularity in the fissiparous *Lophohelia*, as shown on pl. viii. of Lacaze-Duthiers' paper, are very instructive.

Young corallites of *Manicina* produced directly from larval polyps have been collected exhibiting the exact corresponding septal stage of fig. 1, namely, twelve large septa, twelve alternating medium septa, and twenty-four very small septa. Exosepta are usually, if not always, wanting in *Manicina*, and also in many other fissiparous corals.

It is at about the stage represented in fig. 1 that partial fission is introduced. One of the most regular instances of this obtained is shown diagrammatically in fig. 2. It is evident that a polyp at the stage of fig. 1 has become elongated in the direction of the principal or directive axis and that fission has taken place midway at right angles to this plane. Two oral apertures and two stomodæa occur, distinct from one another all the way. Attached to each stomodæum are six pairs of mesenteries, which include members of the original primary and secondary orders. Obviously only one pair of directives is available for each stomodæal system. The plane of fission is included within the shorter axis of the original oval-shaped oral aperture and within the entocœle of a pair of mesenteries on opposite sides.

Fig. 2.



Diagrammatic arrangement of the mesenteries in a bioral polyp of *Manicina areolata.*

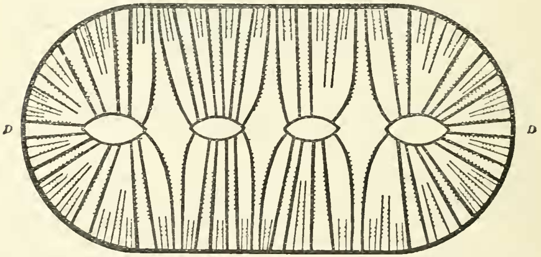
Were the two halves to become entirely distinct at this stage each would preserve the hexameral character, but would differ from the original polyp in having only one pair of directives. The third order mesenteries of fig. 1 would be second order mesenteries of the two new polyps, and the original fourth order pairs would advance to members of the third order.

Other polyps which have been examined at the bioral stage reveal that the arrangement of the mesenteries is not always so regular as that here given. Yet the essential facts are invariably the same, namely, the insertion of one pair of directives and a certain number of pairs of the original complete mesenteries on each stomodæum and the entocœlic plane of separation of the two moieties.

As the bioral polyp continues its growth more pairs of mesenteries extend as far as each stomodæum, and other new pairs arise on the polypal wall in a more or less irregular manner.

The next fission-stage available is one in which four oral apertures are present on an elongated disk surrounded by a single system of tentacles and a single column-wall. Stages with three oral apertures seem to be very rare, so that evidently fission of each of the two stomodæa occurs at about the same time. Fig. 3 represents the essential relationships of the mesenteries and the four stomodæa. By this time scarcely any constancy is evident in the number of mesenteries attached to each stomodæum or in the number of incomplete pairs which may occur in the exocœle between any two complete pairs.

Fig. 3.



Diagrammatic arrangement of the mesenteries in a polyp of *Manicina areolata* with four stomodæal systems.

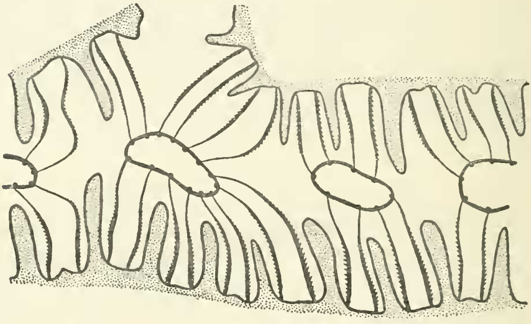
Only the two primary pairs of directives still occur, situated at the opposite extremities of the system, where growth is generally proceeding more rapidly than elsewhere. No new directives are found ever to arise. A variable number of mesenterial pairs is associated with each stomodæum, the hexameral plan being wholly departed from. Except in one doubtful case, the plane of fission has been found to be always included within the entocœle of two opposite pairs of complete mesenteries.

During the subsequent growth of the multioral polyp the original linear arrangement is soon lost, owing to the fact that one lateral area may grow more rapidly than another, and so give rise to the sinuous outlines of the mature colony. The variability in the rate of growth of different regions would seem to be the main cause of the irregularity of the cyclical plan. The smallest mesenteries become larger and ultimately reach the stomodæum, while others arise to constitute the lower orders. It is doubtful, however, as to how far mesenterial orders or cycles should be recognized in fissiparous polyps, seeing that the members of a lower order assume later the position and relationships of the higher orders. New mesenteries are intercalated among the others wherever growth is proceeding more rapidly, and this without reference to any cyclic plan. With the increase in the number of mesenteries additional stomodæa arise at somewhat regular intervals, but not, however, in such a manner as to constitute new individual polyps. Over a score of colonies of *Manicina* in various stages of growth have been sectionized; yet in no instance has more than the two primary pairs of directives occurred. Examination of parts of the mature colonies has also failed to reveal such. It must therefore be assumed that in any colony of *Manicina*, however large, only two possible pairs of directives occur, situated at what are to be regarded as the two morphological extremities of the colony.

Results similar to the above have been obtained from the early stages in the development and fission of *Favia fragum*, though examples are not so readily obtained as in the case of *Manicina*. The simple unioral polyps are found to be regularly hexameral, and in two bioral polyps studied fission had been introduced during the course of the formation of the third cycle of mesenteries. As in *Manicina*, the fission-plane in *Favia* is practically at right angles to the elongated directive plane, and is included within two entocœlic chambers belonging to opposite sides; the two pairs of directive mesenteries also remain at the opposite extremities. Likewise the number of mesenterial pairs associated with each stomodæum is variable.

Separation of the results of fission by the production of transverse partition walls takes place much more frequently in *Favia* than in *Manicina*. On any fully established colony of *Favia* many so-called polyps possess only one mouth, others two or three, but not often more. After its formation, therefore, a stomodæal system may become entirely separated from the others, provided with its own disk, zone of tentacles, and column wall, as if it were a distinct polyp. A number of these apparent polyps have been sectionized, but none show any directive mesenteries, and the hexameral plan is wholly departed from. Two or three different sizes of mesenterial pairs are represented, but the grouping does not retain the cyclical regularity all the way round. They are simply fragments cut off a larger polyp and do not represent new individuals.

Fig. 4.



Arrangement of the mesenteries in a portion of a colony of *Mæandrina labyrinthica*. Two complete stomodæal systems are represented and parts of other two. The septal invaginations at this level are all entocœlic. Partly diagrammatic.

The close similarity in the polypal systems of adult colonies of *Isophyllia*, *Mæandrina*, *Colpophyllia*, &c. to those in *Manicina* and *Favia*, and the like general arrangement of the mesenteries and septa, would lead one to infer a similar course of development for these fission genera—that is, that all have been derived from the continued growth and fission of a single primarily hexameral polyp. A transverse section through a part of the polypal growth of *Mæandrina* is represented in fig. 4 for comparison with the fission-stages in

*Manicina.* For the present purpose the fragment figured will serve for practically the whole polypal system of a brain-coral, however large. No directives occur, the plane of fission between one polypal system and another is always entocœlic, and the mesenterial pairs usually extend as far as the stomodæum, though sometimes incomplete pairs are found *.

On almost any colony belonging to the genera first mentioned as reproducing by gemmation one or more enlarged polyps may frequently be found exhibiting one stage or another in simple fission. These exceptional cases of fission on gemmiferous colonies will be dealt with in a subsequent paper. It is found that the process differs wholly from that above described for *Manicina.* The resulting polyps are altogether like ordinary gemmation-polyps in that they retain the hexameral cyclical plan and possess two pairs of directives. I endeavour to show that they are best regarded as representing a specialized form of gemmation, not true fission as here understood.

Other than these there seems to be no combination in a species as regards either budding or fission, though such might be reasonably expected. I have come upon no instance of true fission in corals of which the normal method of increase is by gemmation, and, *vice versâ*, no example of budding in polyps which enlarge by fission. Frequently in fissiparous colonies fragments of the polypal system are found wholly isolated from the main mass and appear as if they might have arisen as buds from the wall of the parent; but in sections they exhibit all the characteristics of fission-fragments—that is, they are devoid of directives, and present no hexameral or other cyclical regularity as regards the mesenteries.

We are now in a position to understand the true significance of gemmation and fission as they occur in corals. The complete correspondence as regards the number, character, and arrangement of the tentacles, mesenteries, and septa of bud-polyps with those of polyps reared directly from larvæ shows that the former are to be regarded as altogether new individuals. The parts appear to be formed, as it were, *de novo*, as in the growth of a polyp from the larva. It is otherwise, however, in fission-corals. Only the early larval polyp follows the hexameral cyclic plan, and possesses two pairs of directives. No wholly new individual polyps seem ever to arise by fission; growth consists in an increase in number and size of organs in intimate association with those of the larval polyp, and fission is simply a separation, either partial or complete, of parts of this growth. It is not a separation of parts arising independently; in the early stages of fission the constituent organs of the original larval polyp can be traced as constituents of separate stomodæal systems. Fission does not result in the production of new individuals; it merely divides partially or completely an enlarged growth, and each fragment continues its growth on the same plan until fission may again step in. Even where the products of fission become completely or almost completely separated from one another, as in *Favia*, *Isophyllia*, *Mussa*, and *Lophohelia*, the isolated fragments are not new polyps in the sense in which they are in gemmiferous species; they merely represent a part pinched off an enlarged growth.

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* Verrill (1901, pp. 65, 68, 71) refers to cases of apparent exothecal budding on the collinal ridges of *Mæandra* (*Mæandrina*). It would be of great interest to determine the actual mode of formation of these as concerns the polyps. According to the view presented in this paper, budding would be established only if the polyps were found to possess directives and the hexameral cyclical plan; the absence of directives and an irregular cyclical plan would denote fission.

A new oral aperture and stomodæum with the associated mesenteries cannot be considered in themselves as constituting a new individual polyp. Only when parts arise *de novo*, or, at any rate, completely reproduce the main essentials of the sexually produced polyp, can they be regarded as additional members of a colony.

It follows, therefore, that the entire polypal system of a fissiparous coral, however large, is not made up of individual polyps, but is an enlarged complex growth of the primary larval polyp in which new oral apertures have been formed to meet physiological needs. Morphologically, an enlarged fissiparous coral admits of comparison only with a single individual of a gemmiferous colony; only two pairs of directives occur in each. The former is frequently meandering in character, or by frequent transverse growths may become broken up and assume more the character of separate polyps. A fissiparous coral, whatever its extent or complexity, has not the morphological value of a colony in the sense of being constituted of distinct individuals.

### *Summary.*

*a.* The bud-polyps of gemmiferous corals arise as new individuals. In the course of their development they pass through the same stages as larval polyps, and ultimately possess all the distinctive characteristics—cyclical hexameral plan and directive mesenteries—of sexually produced polyps.

*b.* Larval polyps of fissiparous corals at first present a regular cyclical hexameral arrangement of the mesenteries, tentacles, and septa. The first fission partially or wholly divides the polyp into two practically equal parts in an entocœlic plane at right angles to the directive plane, each half having but one pair of directive mesenteries. In the later growth new mesenteries arise in isocnemic pairs more rapidly in some regions than in others, and thus destroy the regularity of the cyclical hexameral plan. Additional oral apertures and stomodæa, with which a variable number of mesenteries are associated, arise at somewhat regular intervals. The various stomodæal systems may remain in continuity with the common gastro-cœlomic cavity, or partitions may be formed in a greater or less number and lead to their partial or complete separation. No new pairs of directives ever arise, so that, however large the polypal system may become, never more than the two primary pairs of directives are present.

*c.* Morphologically a fissiparous coral, whatever its size, is to be regarded as only a single complex polyp, as contrasted with a gemmiferous colony, which is made up of numerous distinct individual polyps.

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## LIV.—*Descriptions of new Batrachians and Reptiles from the Andes of Peru and Bolivia.* By G. A. BOULENGER, F.R.S.

### *Hyla armata.*

Tongue circular, entire, slightly free behind. Vomerine teeth in two very strong, short, transverse series behind the level of the choanæ. Head moderate, broader than long; snout rounded, barely as long as the diameter of the eye; canthus rostralis distinct; loreal region oblique, concave; interorbital region as broad as the upper eyelid; tympanum moderately distinct, about one third the diameter of the eye. Fingers webbed at the base; no projecting rudiment of pollex; toes nearly entirely webbed; disks of fingers rather more than half the diameter of the eye, of toes a little smaller; subarticular tubercles moderate; no tarsal fold. Tibiotarsal articulation reaching between the eye and the tip of the snout. Upper parts with small smooth warts, belly and lower surface of thighs granular. Greyish brown above, spotted or marbled with darker; sides white, largely marbled with dark brown; hind limb with dark cross-bands separated by narrow light interspaces; lower parts greyish brown. Male with an internal vocal sac, and with large, black, horny, pluricuspid nuptial plates, one under the arm, two close together on the inner side of the inner finger.

From snout to vent 64 millim.

Two specimens, male and female, from La Paz, Bolivia, 4000 m., collected by the late P. O. Simons.

### *Hyla callipleura.*

Tongue subcircular, entire or indistinctly nicked, slightly free behind. Vomerine teeth between the very large choanæ, in two oblique series, forming a chevron pointing forwards. Head moderate, as long as broad or slightly broader than long; snout rounded, as long as the diameter of the eye; canthus rostralis distinct; loreal region oblique, slightly concave; interorbital region as broad as the upper eyelid; tympanum very distinct, three fifths or two thirds the diameter of the eye. Three outer fingers one-third webbed; a distinct rudiment of pollex; toes three-fourths webbed; disks smaller than the tympanum; subarticular tubercles feeble; no tarsal fold. Tibio-tarsal articulation reaching the tip of the snout. Skin smooth above, granular beneath.

Grey or brown above, with or without darker dots, with more or less distinct dark cross-bars, which may enclose light spots, the first of these bars between the eyes; a dark streak on the canthus rostralis and temple; limbs with more or less distinct dark cross-bars; flanks and hinder side of thighs blackish brown, with round white spots, or barred or marbled with white. Bones green. Male with an external gular vocal sac.

From snout to vent 45 millim.

Several specimens were collected by P. O. Simons in Bolivia, at Charuplaya (1350 m.) and at San Ernesto, Mapiri district (500 m.).

This species is closely allied to *H. crepitans*, from which it differs in the narrower interorbital region, the absence of a tarsal fold, and the smaller size.

### *Phyllomedusa boliviana.*

Tongue scarcely emarginate behind. Vomerine teeth in two small, slightly oblique groups between the choanæ. Snout as long as the diameter of the eye, not projecting beyond the mouth; loreal region oblique, concave; interorbital space as broad as the upper eyelid; tympanum three fifths to two thirds the diameter of the eye. Fingers free, first shorter than second, third and fourth equal; toes free, first longer than second; disks of fingers and toes much smaller than the tympanum; subarticular tubercles strong; inner metatarsal tubercle not prominent. The tibio-tarsal articulation reaches the tympanum or the eye. Upper surfaces smooth; parotoids very distinct, nearly as long as the head; throat, belly, and lower surface of thighs granulate. Blue-green above (in spirit); supraciliary edge and lower lip pinkish white, which colour extends backwards to the side of the body, where it forms a broad band speckled with purple; this band does not extend to the groin; thighs green, except below; belly and lower surface of thighs greyish white; throat and lower surface of hands and feet purplish; a pinkish-white streak, edged with purple along the outer side of fore-arm and outer finger, and another across heel and along outer side of tarsus and outer toe. Male with an internal vocal sac and with a patch of black nuptial asperities on the inner side of the inner finger.

From snout to vent 75 millim.

Two specimens, male and female, from Chulumani, Bolivia, 2000 metres, collected by P. O. Simons.

### *Bufo Ockendeni.*

Crown with feeble bony ridges, including a parietal obliquely directed inwards; snout truncate, slightly projecting; loreal region concave; interorbital region broader than the upper eyelid; tympanum very small, indistinct or hidden. Fingers rather long and slender, first not extending as far as second; toes nearly entirely webbed, with somewhat swollen tips and simple subarticular tubercles; two small metatarsal tubercles; an indistinct tarsal fold. Tarso-metatarsal articulation reaching a little beyond the tip of the snout. Upper parts with small irregular warts; parotoids moderately prominent, oval, about half as long as the head. Olive-grey or brownish above, marbled with darker; limbs with irregular dark cross-bars; lower parts dirty white, spotted or marbled with blackish. Male with an internal vocal sac.

From snout to vent 55 millim.

Several specimens, collected in the Marcapata Valley, E. Peru, by Mr. G. Ockenden, and at Charuplaya, Bolivia, by P. O. Simons.

### *Hylodes cruralis.*

Tongue oval, entire. Vomerine teeth in two round groups on a level with the posterior border of the choanæ. Head slightly longer than broad; snout rounded, as long as the diameter of the orbit; canthus rostralis feeble; loreal region concave; interorbital space as broad as the upper eyelid; tympanum very distinct, two thirds the diameter of the eye. Fingers rather long, first not extending beyond second; toes moderate, with a slight rudiment of web; disks and subarticular tubercles well developed; two very distinct, subequal, round metatarsal tubercles. The tibio-tarsal articulation reaches the tip of the snout. Skin slightly rugose above, with a raised vertebral line; no glandular dorso-lateral fold; belly smooth. Greyish above, with darker symmetrical markings; a round whitish spot between the shoulders; lips with dark vertical bars; limbs with dark cross-bars, which form chevrons pointing backwards on the tibia; lower parts greyish brown.

From snout to vent 28 millim.

A single specimen from La Paz, Bolivia, 4000 m., collected by P. O. Simons.

Near *H. Gollmeri*, Peters.

### *Atelopus tricolor.*

Habit slender. Head longer than broad, about half as long as the trunk, sides vertical; snout very prominent, truncate, longer than the eye; nostril nearer the tip of the snout than the eye; interorbital space much broader than the upper eyelid. Fore limb rather slender; fingers webbed at the base, first very short; toes nearly entirely webbed; no metacarpal, metatarsal, or subarticular tubercles. The tibio-tarsal articulation reaches the eye or between the eye and the tip of the snout. Skin smooth. Black above, with round yellow spots, a yellow streak on each side of back from eye to groin, and a yellow streak round the upper lip; lower parts yellow, with black marblings on the sides and under the limbs and sometimes a few round black spots on the belly; axillary and inguinal regions and palmar and plantar surfaces bright vermilion.

From snout to vent 21 millim.

Several specimens from the Marcapata Valley, E. Peru, collected by Mr. Ockenden.

### *Prostherapis bolivianus.*

Snout short, truncate, with angular canthi and nearly vertical lores; nostril a little nearer the tip of the snout than the eye; interorbital space broader than the upper eyelid; tympanum distinct, two thirds the diameter of the eye. First and second fingers equal; toes quite free; disks of fingers and toes small; two metatarsal tubercles, inner oval, outer round. The tibio-tarsal articulation reaches the eye. Skin smooth, somewhat granular on the back. Dark grey-brown above, black on the sides of the head and body; a white line borders the upper surface of the head, along the supraciliary edge and round the snout, and extends along the side of the body to the groin; another borders the upper lip and extends to the fore limb; sides of limbs and lower parts white, spotted or marbled with black. Male with an internal vocal sac.

From snout to vent 26 millim.

Two specimens from San Carlos, Bolivia, 1200 m., and one from S. Ernesto, Bolivia, 800 m. Collected by P. O. Simons.

### *Liolæmus tropidonotus.*

Nostril supero-lateral. Upper head-scales small, smooth; two longitudinal series of scales on the frontal region; interparietal and parietals small, subequal; four or five supraoculars feebly enlarged transversely; a single series of scales between the labials and the subocular; two or three projecting granules on the anterior border of the ear. Sides of neck granular, strongly folded. Dorsal scales rather small, rhomboidal, obtusely pointed, as long as broad or slightly longer than broad, strongly keeled, strongly imbricate; lateral scales smaller, smooth or feebly keeled; ventral scales a little larger than dorsals, strongly imbricate, smooth, rounded; 60 to 66 scales round the middle of the body. The adpressed hind limb reaches the shoulder; digits rather short; hinder side of thighs uniformly granular. Male with 5 anal pores. Tail about once and one third as long as head and body; upper caudal scales larger than dorsals, strongly keeled, pointed but not mucronate. Brown or green above, with three light longitudinal streaks with dark bars or square transverse spots between them; lower parts white, belly uniform or with small greyish spots, throat abundantly spotted with blackish; hinder side of thighs with white spots between a dark network.

| | millim. |
|---|---|
| Total length | 150 |
| Head | 17 |
| Width of head | 14 |
| Body | 43 |
| Fore limb | 24 |
| Hind limb | 38 |
| Tail | 90 |

One male and two young from Tirapata, E. Peru, 13,000 feet, collected by Mr. G. Ockenden.

Closely allied to *L. multiformis*, Cope, and *L. annectens*, Blgr. Distinguished by the strongly keeled dorsal scales.

### *Liolæmus Simonsii.*

Nostril supero-lateral. Upper head-scales small, smooth; one to three azygos scales on the frontal region; interparietal and parietals small, subequal; four to six supraoculars more or less enlarged transversely; a single series of scales between the labials and the subocular; two or three more or less distinct projecting granules on the anterior border of the ear. Sides of neck granular, strongly folded. Dorsal scales rather small, rounded, as long as broad or a little broader than long, more or less strongly keeled and imbricate; ventral scales a little larger than dorsals, strongly imbricate, smooth, rounded; 60 to 65 scales round the middle of the body. The adpressed hind limb reaches the ear, or between the shoulder and the ear; digits longer than in the preceding species, the claws more slender; hinder side of thighs uniformly granular. Male with 6 to 8 anal pores. Tail once and a half to once and three fourths as long as head and body; upper caudal scales larger than dorsals, keeled and usually slightly mucronate. Greyish or brownish above, sometimes tinged with orange, usually with blackish and yellow spots, the larger blackish spots in form of more or less regular bars disposed in longitudinal and transverse series; a more or less distinct white band between two black lines on the hinder side of the thighs; lower parts white, throat usually spotted or marbled with blackish.

| | millim. |
|---|---|
| Total length (of male) | 170 |
| Head | 17 |
| Width of head | 13 |
| Body | 48 |
| Fore limb | 25 |
| Hind limb | 42 |
| Tail | 105 |

Numerous specimens from Bolivia, collected by P. O. Simons at Potosi, 4200 m., Challapata, 3700 m., and Uyuni, 3660 m.

### *Tropidurus melanopleurus.*

Upper head-scales smooth; a series of five or six transversely enlarged supraoculars, not quite half as broad as the supraocular region; occipital broader than long, a little broader than the supraocular region; anterior border of ear scarcely denticulated; temples granulate. A strong curved antehumeral fold, narrowly separated from its fellow on the throat; latter distinctly folded, as well as the sides of the neck, which are minutely granulate. Body much depressed; a mere indication of a very slight nuchal crest, not continued on the body; dorsal scales small, rhomboidal, juxtaposed, faintly keeled; lateral scales much smaller still; ventral scales as large as dorsals, subimbricate, smooth. The adpressed hind limb reaches the eye. Tail nearly twice as long as head and body, rounded, without crest, the scales larger than those on the body. Dark olive above, sides of head and body black; a broad yellowish band on each side, from behind the eye to above the groin; throat and antehumeral fold black; belly white.

| | millim. |
|---|---|
| Total length | 230 |
| Head | 20 |
| Width of head | 14 |
| Body | 57 |
| Fore limb | 37 |
| Hind limb | 54 |
| Tail | 153 |

Two female specimens from Tamampoya, Bolivia, 1200 m., collected by P. O. Simons.

This species is closely allied to *T. peruvianus*.

### *Cnemidophorus vittatus.*

Nostril between the two nasals. Three large parietals, and a small outer one on each side; two large supraoculars; 7 or 8 supraciliaries; no frenoorbital; anterior gular scales larger than the posterior; a few enlarged mesoptychial scales. Dorsal scales minutely granular, smooth. Ventral plates in ten longitudinal series. A number of enlarged præanals, the central one largest. Brachials in three rows, continuous with the postbrachials; antebrachials in two rows. Femorals in six series, one of which is large; tibials in three series, outer largest. Femoral pores 9–10. Caudal scales oblique, diagonally keeled. Grey above, sides striped black and white, the widest black stripe extending from the eye to the tail, and reappearing as a line on the canthus rostralis; sides of limbs with black and white stripes; upper lip and lower parts white.

| | millim. |
|---|---|
| Total length | 132 |
| Head | 12 |
| Width of head | 6 |
| From end of snout to interparietal plate | 8 |
| Width at posterior corners of supra-ocular regions | 4·5 |
| From end of snout to fore limb | 18 |
| From end of snout to vent | 47 |
| Fore limb | 17 |
| Hind limb | 27 |
| Tail | 85 |

A single specimen from Paratani, Bolivia, 2500 m., collected by P. O. Simons.

### *Oreosaurus ocellifer.*

Head short, body and limbs moderate. Frontonasal quadrangular, a little longer than broad; frontal pentagonal, narrower than the frontonasal; interparietal a little larger than the parietals, followed by three small occipitals, forming a triangle; three supraoculars; no loreal; a series of infraorbitals; six upper labials; chin-shields, one anterior and three pairs meeting on the median line; eight series of scales between the chin-shields and the edge of the collar; collar-shields 9. Dorsal scales quadrangular, keeled, more than twice as long as broad; lateral scales smaller, but not granular; 30 scales round the middle of the body, ventrals included; 29 scales from occiput to base of tail. Ventrals large, quadrangular, in eight longitudinal and nineteen transverse series. A pair of large præanals. Femoral pores 7–8. Scales on the tail like those on the body. Brown above, darker on the sides; a yellowish dark-edged streak on each side of the head, behind the eye, and of the anterior part of the back; a series of 7 or 8 black ocelli with small white centres on each side of the body, beginning beneath the light lateral streak; sides of head yellowish, mottled with dark brown; belly uniform yellowish, throat dotted with dark brown.

| | millim. |
|---|---|
| Total length | 107 |
| Head | 9 |
| Width of head | 4·5 |
| From end of snout to fore limb | 13 |
| From end of snout to vent | 35 |
| Fore limb | 9 |
| Hind limb | 12 |
| Tail | 72 |

A single specimen from the Marcapata Valley, E. Peru, collected by Mr. Ockenden.

### *Homalocranium marcapatæ.*

Eye half as long as the snout, which is broadly rounded and feebly projecting. Rostral considerably broader than deep, scarcely visible from above; internasals two thirds the length of the præfrontals; frontal pentagonal, more than twice as broad as the supraocular, a little longer than broad, a little longer than its distance from the end of the snout, shorter than the parietals; nostril between two nasals; a small loreal; one præ- and two postoculars; temporals 1+2; seven upper labials, third and fourth entering the eye; first lower labial in contact with its fellow behind the symphysial; four lower labials in contact with the anterior chin-shields, which are slightly longer than the posterior. Scales in fifteen rows. Ventrals 180; anal single; subcaudals 47. Red above, with black cross-bars; on the anterior part of the body these bars are as broad as the interspaces between them, while further back they become narrower; some of them are broken on the vertebral line, the two halves alternating; anterior part of head, parietal shields, and lips black; belly yellowish, with a series of large black spots on each side, alternating with the black cross-bars of the upper surface; lower surface of tail mottled with black.

Total length 390 millim.; tail 72.

A single female specimen from the Marcapata Valley, E. Peru, collected by Mr. Ockenden.

### *Elaps regularis.*

Eye slightly shorter than its distance from the mouth. Rostral large, broader than deep, the portion visible from above measuring one third its distance from the frontal; latter a little broader than the supraocular, once and one third as long as broad, as long as its distance from the end of the snout, a little shorter than the parietals, the length of which equals their distance from the internasals; one præ- and one postocular; temporals 1 + 1; seven upper labials, third, fourth, and fifth entering the eye; four lower labials in contact with the anterior chin-shields, which are slightly shorter than the posterior. Scales in fifteen rows. Ventrals 214; anal divided; subcaudals 26, the first six single. 39 black annuli disposed with great regularity and as broad as or a little narrower than the interspaces, the scales on which are red with dark brown tips; the first annulus begins immediately behind the parietal shields, which, together with the temporals and the sixth upper labial, are yellow, the rest of the head being black.

Total length 315 millim.; tail 24.

A single specimen from Chulumani, Bolivia, 2000 m., collected by P. O. Simons.

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## LV.—*On the Genus* Ateleopus *of Schlegel.*

By G. A. Boulenger, F.R.S.

I have already pointed out in these 'Annals'[*] that the name *Ateleopus*, Schlegel, 1846, for a genus of deep-sea fish from Japan, to which a species from the Indian seas has recently been added, is preoccupied by *Atelopus*, Duméril and Bibron,

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[*] Ser. 6, vol. xiv. 1894, p. 374.

1841, a Batrachian genus from South America. I now propose to change the name of the fish to *Podateles* and the family name Ateleopodidæ of Günther to Podatelidæ.

The family Ateleopodidæ has hitherto been placed near the Macruridæ; but it differs from them, and is more nearly related to the Blenniidæ, in having the scapular foramen pierced in the scapular bone, which does not support any of the pectoral rays. It is distinguished from both the Macruridæ and the Blenniidæ in having the supratemporal bone loosely attached by ligament to the skull and the pectoral rays inserted on an undivided cartilaginous plate instead of a series of pterygial bones or basalia.

If, following Gill and other American writers, we attach importance to the structure of the pectoral arch in the classification of the jugular fishes, the Lycodidæ and Ophidiidæ should be placed, with the Zoarcidæ, nearer to the Blennies than to the Gadoids. The point in question had never been ascertained on the Ateleopodidæ, which must now be removed from the immediate vicinity of the Gadoids, and included in the series Blenniidæ—Ophidiidæ.

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## LVI.—*A new* Rhynchocyon *from Nyasaland.*

By OLDFIELD THOMAS.

### *Rhynchocyon Hendersoni*, sp. n.

A member of the *R. Cirnei–Reichardti* group.

General body-colour grizzled dusky grey, much darker than in *R. Cirnei* and *Reichardti*. On each side of the posterior back two deep black stripes, and below them a third indistinct rufous one; in the hollows of the upper stripe four, of the middle six, and of the lower four indistinct whitish spots, much less conspicuous than in *R. Reichardti*. Head dark, grizzled blackish. Ears dark fulvous, edged with black. Under surface dusky, darker than in the other species, the hairs tipped with buffy. Forearms and thighs dark grizzled fulvous; hands and feet black, the ankles grizzled with fulvous. Tail black, with a white subterminal ring; the underside of its basal two inches fulvous.

Dimensions of the type (measured in skin):—

Head and body 250 millim.; tail 214; hind foot (s. u.) (wet) 67; ear (wet) 27.

*Hab.* Plateau west of Lake Nyasa.

*Type.* B.M. no. 2. 9. 8. 1. Collected and presented by the Rev. James Henderson, of the Livingstonia Institution.

Much darker in general tone than either, and with blacker stripes, this species is more or less intermediate in marking between the *R. Cirnei* of Southern Nyasaland and the *R. Reichardti* of the Tanganyika plateau. *R. Stuhlmanni*, Matsch., from the Semliki, has a similar general colour, but has fewer black stripes.

Mr. Henderson was the discoverer of the striking monkey recently described as *Cercopithecus Francescæ*, and is to be congratulated on this second interesting capture.

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## LVII.—*On new Species of South-African* Curculionidæ *of the Genus* Hipporrhinus, *Schön.* By GUY A. K. MARSHALL, F.Z.S.

THE publication of the following descriptions is the result of a careful examination of all the species of *Hipporrhinus* contained in the British, Stockholm, and Oxford Museums, as well as those in my own collection, and is intended merely as a preliminary to a full revision of this polymorphic genus as soon as I have had access to further expected material. For many of the species here described I am indebted to my good friends Dr. H. Brauns, of Willowmore, Cape Colony, and Dr. Walther Horn, of Berlin, who have generously contributed large numbers of South-African Curculionidæ to my collection: most of the Transvaal species were kindly sent to me some years ago by Dr. J. W. B. Gunning, of the Pretoria Museum; others were captured by myself in Natal and Mashonaland; but the majority of the species are from the fine collections of Pascoe and Jekel contained in the British Museum. Wherever possible, examples in the National Collection have been selected as types; the remainder have been described from my own collection; but the type specimens will shortly be handed over to the British Museum, in order to render them more accessible to other workers. I am indebted to the authorities of that institution for their courtesy in permitting me to take a number of examples from the Museum over to Stockholm, for the purpose of comparison with the types there, which has much facilitated my work. My thanks are also due to my friends Prof. Aurivillius and Prof. Sjöstedt, who kindly afforded me every assistance in their power during my stay in Stockholm.

### *Hipporrhinus nestor*, sp. n.

Long. (excl. apical spines) 20 millim., lat. 8 millim., apical spines 2 millim.

*Head* convex, with deep scattered punctures and large white scales; forehead with a short central stria; anteocular furrows faint, the lower half obsolete. *Rostrum* not incised at base, as long as head and prothorax, gently curved. Upper surface convex in basal half and broadly excavate near apex, distinctly punctured, and with a broad smooth central line; lateral sulci not meeting at base, broad and deep, separated by a narrow carina, and filled with large white scales; scrobes running beneath base of rostrum; inferior basal furrow shallow. *Antennæ* with scape not nearly reaching eye; the two basal joints of funicle subequal. *Prothorax* slightly transverse, the length about equal to the width at base, which is broader than apex, sides not much rounded, broadest about middle, ocular lobes strongly developed. Upper surface convex, with distant rounded tubercles, which are flattened and arranged in more or less regular rows on disk, smaller more elevated and irregular laterally; central furrow very broad and containing a short faint carina; apices of tubercles black, shiny, and with very short depressed setæ, interstices with dense white scaling. *Elytra* oblongo-ovate, sides scarcely rounded, broadest before middle, shoulders rounded, apical processes very long and sharp. Upper surface convex, striæ with regular rows of small granules, the alternate intervals more prominent: intervals 1, 4, and 6 entirely devoid of tubercles; interval 2 with only a single very large and sharp tubercle on the summit of the declivity; interval 3 with three large, smooth, catenulate tubercles at base, thence with an irregular row of small rounded tubercles to beyond middle, where they become larger and sharply conical, the largest being on the summit of the declivity; this tubercle is of the same size as, and adjoins, that on interval 2, so as to form a conspicuous transverse row of four large tubercles; interval 5 with a very large, rounded, boss-like tubercle at base, followed by two similar but much smaller ones, then five or six small granular tubercles, and finally two or three larger conical ones beyond middle; interval 7 with a complete row of small, closely-set, conical tubercles. *Legs* with dense, even, white scaling; posterior tarsi with the three basal joints of about the same width, second and third subequal, first longer.

Cape Colony.

This very distinct insect falls into a small group with *nodulosus*, F., and *occidentalis*, Mshl., on account of the large boss-like tubercle at the base of the fifth interval. Apart from their smaller size, these species differ in the presence of a smooth longitudinal space on either side of the thoracic furrow and in the absence of the large conical tubercle on the second interval.

### *Hipporrhinus occidentalis*, sp. n.

Long. 15, lat. 7 millim.

*Head* convex, obscurely punctured and covered with large brown scales, except a short smooth line on forehead, which contains a small puncture; a narrow ring of white scales round each eye; anteocular furrows practically obsolete. *Rostrum* not incised at base, as long as head and prothorax, very little curved. Upper surface rather convex at base, but broadly excavate towards apex, punctured and covered with brown scales except for a broad smooth central line; lateral sulci not meeting at base and filled with large white scales; upper pair very broad and deep, the lower narrow and faint; scrobes directed beneath base of rostrum; inferior basal transverse furrow obsolete. *Antennæ* with dense pale scaling and black setæ; scape not nearly reaching eye; the two basal joints of funicle subequal. *Prothorax* as long as broad, apex narrower than base, sides slightly dilated, with a small tubercular angulation before middle; ocular lobes strongly developed. Upper surface convex, with a broad lance-shaped central furrow containing a low carina and flanked on either side by two rows of closely but irregularly placed tubercles; beyond these is a smooth longitudinal band, followed by a single regular row of tubercles close to the lateral margin, and below this another similar row, of which a single tubercle is rather larger than the others and forms the lateral projection; scaling on disk brown, but greyish in central furrow and on prosternum. *Elytra* oblongo-ovate, shoulders roundedly prominent, sides very little rounded, broadest about middle, apical processes of elytra long and sharp. Upper surface convex, with regular rows of large and deep punctures, the alternate intervals dissimilar; intervals 1, 2, 4, and 6 devoid of tubercles (except a single small one near base of the latter); intervals 3 and 7 with complete rows of conical tubercles, which become more distant, larger, and sharper towards apex; interval 5 with a very large, rounded, boss-like tubercle at base, followed by six closely-set conical tubercles, and a solitary larger and sharper one about the summit of the declivity; scaling dense, dark brown, except the suture and reflexed margins, which are grey; the boss-like tubercle is entirely bare, the others only so at their apices, which occasionally bear a short depressed seta. *Legs* with dense grey scaling; posterior tarsi narrow, joints of about equal width, second longer than third, and first longer than second.

WEST AFRICA (?).

The type in the National Collection is labelled "West Africa," but the locality seems a very doubtful one, and it is more probable that the insect came from South-west Africa. *Occidentalis* is nearly allied to *nodulosus*, F.; but the latter differs in that there is no central carina on the prothorax and the fifth interval on the elytra has only two or three large, distant, conical tubercles in addition to the basal one.

### *Hipporrhinus fictilis*, sp. n.

Long. 14, lat. 6 millim.

*Head* convex, with close shallow punctures and dense brown scaling, forehead with an elongate central fovea; anteocular furrows deep in their upper half, shallow below. *Rostrum* not incised at base, as long as head and prothorax, slightly curved. Upper surface convex at base, shallowly excavate towards apex, finely and sparsely punctured, with a broad smooth central line; lateral sulci well developed, not meeting at base; scrobes directed to beneath base of rostrum; inferior basal furrow distinct. *Antennæ* with the scape very short, not nearly reaching eye; the two basal joints of funicle short, subequal. *Prothorax* longer than its width at base, which is broader than the apex, sides strongly angulated, broadest before middle, ocular lobes prominent. Upper surface rather convex, with a broad and deep central furrow, containing no carina and flanked by a high narrow ridge composed of agglomerated tubercles; beyond this a broad smooth space, followed by a lateral ridge quite similar to the dorsal one; beneath this are two or three scattered tubercles, including a large compressed one which forms the angular projection; all the tubercles smooth and without setæ; scaling dense and brown, but paler in the median furrow, the prosternum greyish. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest about middle, apical processes short but sharp. Upper surface convex, with regular rows of large shallow punctures; intervals 1, 2, 4, and 6 entirely devoid of granules or tubercles; intervals 3 and 7 with complete rows of small rounded shiny tubercles, becoming rather larger and more conical towards apex; interval 5 with a similar row, but ceasing abruptly behind middle; intervals 1 and 2 are so narrow that the three spaces between the four dorsal rows of tubercles are of about equal width; scaling dense, uniform earthy brown, margins broadly greyish white. *Legs* with dense pale scaling; posterior tarsi with joints of about the same width, first the longest and third the shortest.

Cape Colony.

Of much the same build and facies as *nodulosus*, F., and *occidentalis*, Mshl., but readily separable owing to the absence of the large basal tubercle on interval 5 of the elytra. The species is closely allied to the much larger *canaliculatus*, Mshl. (*vide infrà*).

### *Hipporrhinus canaliculatus*, sp. n.

Long. 22, lat. 10 millim.

*Head* convex, closely but indistinctly punctured and covered with dense brown scaling; forehead with an elongate central fovea; anteocular furrows deep and distinct in its upper half, obsolete below. *Rostrum* not incised at base, as long as head and prothorax, curved beyond middle; upper surface with the edges angular and subparallel throughout (the genæ dilated at apex as usual), plane at base, shallowly excavate towards apex, with fine close punctuation and sparse scaling throughout, except for a narrow smooth central line; upper lateral sulci entirely dorsal, shallow, not meeting at base and vanishing beyond middle; lower sulci deep and distinct, entirely lateral; scrobes directed beneath base of rostrum; inferior basal furrow shallow. *Antennæ* with the scape not reaching eye; the two basal joints of funicle subequal. *Prothorax* as long as its width at base, apex narrower, sides angulated, with a small but prominent lateral tubercle about middle, ocular lobes well developed. Upper surface not very convex, with a broad deep central furrow, containing a strong carina, and flanked on either side by a high ridge of agglomerated tubercles; beyond this is a broad smooth space, followed by a sharply defined band of small irregularly placed tubercles along the extreme edge; scaling dense, brown above and turning suddenly to white on prosternum immediately below the lateral tubercles. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest about middle, apical processes short but sharp. Upper surface convex, with regular rows of small shiny granules in lieu of punctures; interval 1 granulate; interval 2 with four or five isolated low tubercles; intervals 3 and 5 with small contiguous and usually duplicated tubercles, forming an obtuse carina to beyond middle, after which the tubercles become larger, separate, and sharply conical; 4 and 6 devoid of tubercles; 7 with a complete row of separate conical tubercles, becoming larger towards apex; scaling dark brown, the suture grey, interval 4 wholly and 6 partly white, reflexed margin entirely white. *Legs* with dense pale scaling; posterior tarsi almost devoid of setæ, joints of about the same width, second and third subequal, first longer.

Cape Colony.

A distinct species, resembling the *nodulosus* group in general facies, but differentiated by the absence of the boss-like tubercle on the fifth interval on the elytra. Its nearest ally is *fictilis*, Mshl., which differs in having no carina on the prothorax, in having rows of shallow punctures on the elytra instead of granules, in the absence of tubercles on interval 2, and, finally, in *fictilis* the distance between intervals 3 and 5 is about equal to that between the third intervals on the two elytra, whereas in *canaliculatus* the former distance is less than half the latter.

### *Hipporrhinus incisirostris*, sp. n.

Long. 24, lat. 10 millim.

*Head* convex, closely and finely punctured, forehead flattened and with a very faint central stria; anteocular furrows very deep and distinct. *Rostrum* not incised at base, as long as head and prothorax, moderately curved. Upper surface divided into two portions by a broad and deep transverse incision at about one-third from base; the whole of the basal portion is strongly raised, so as to form a broad, thick, rounded horn, which is distinctly punctured throughout; the upper surface of the anterior portion is broadly excavate, with its edges strongly carinate, and punctured only along the sides and base; upper lateral sulci deep, but narrow and short, ascending the sides of the horn and meeting behind it, but not continued on to the anterior portion; the lower sulci very broad and deep, entirely lateral, and continued from base to the middle of the anterior portion; scrobes directed to beneath base of rostrum; the genæ produced into a prominent sharp point; inferior transverse basal furrow absent. *Antennæ* with scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* rather broader than long, the length greater than the width at base, which again is a little broader than the apex, sides strongly rounded, broadest about middle, ocular lobes almost obsolete. Upper surface almost plane, closely covered with small rounded tubercles, leaving a very indistinct central furrow containing a short but well-marked carina; a distinct transverse dorsal impression just behind apex. Tubercles bare, each with a pale depressed seta; interstices with dense brown scaling. *Elytra* elongato-ovate, shoulders sloping, sides slightly rounded, broadest about middle, the posterior declivity laterally compressed, so that the space between the second intervals on each elytron is distinctly raised, apical processes moderately long and sharp in both sexes. Upper surface convex, faintly striate, the striæ with indistinct punctures separated by small granules; intervals even and with regular rows of granules, except the first, which is smooth throughout, and the lateral compressed portion of the declivity is also almost free from granules; scaling rather thin, variegated brown, paler at sides; setæ pale, very small and much depressed. *Legs* long, rather slender, with sparse pale setæ; posterior tarsi broad, spongy beneath, the joints of about the same width, second and third subequal, first a little longer.

CAPE COLONY.

A remarkable and quite isolated species, which may at once be distinguished from every other member of the genus by the peculiar structure of the rostrum—especially in the character of the basal horn, the transverse dorsal incision, and the acuminate genæ.

### *Hipporrhinus Horni*, sp. n.

Long. 19, lat. 8 millim.

*Head* convex, with dense light brown scaling on vertex; forehead bare, indistinctly punctured and with a central fovea; anteocular furrows distinct. *Rostrum* not incised dorsally at base, about as long as head and prothorax, slightly curved. Upper surface distinctly convex at base, shallowly excavate at extreme apex only; punctuation indistinct, with broad, smooth, scarcely raised central line throughout; lateral sulci not meeting at base, shallow, the lower pair indistinct; scrobes directed to beneath base of rostrum; inferior basal furrow present, but shallow. *Antennæ* with scape not nearly reaching eye; the two basal joints of funicle subequal. *Prothorax* transverse, the length rather greater than the width at base, which is broader than apex, sides subangulate, broadest about middle. Upper surface slightly convex, with four fairly regular rows of small closely-set tubercles, leaving three large smooth longitudinal spaces; the central one is closely and distinctly punctured and contains no carina, the others are indistinctly punctured; below the outer row of tubercles is a collection of four or five tubercles which form the lateral angulation; tubercles black, shiny, and without setæ. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest about middle, apical prominences long, sharp, divergent and turning rather upwards. Upper surface convex, with regular rows of small granules, often separated by large, shallow, indistinct punctures: intervals 1, 2, 4, and 6 plane and smooth; interval 3 with a complete row of shiny brown tubercles, as far as the declivity these are small, rounded, irregular, and often duplicated, but on the declivity they are large and sharply conical; interval 5 with a perfectly regular and closely-set row of small, rounded, brown tubercles from base to about middle, where it terminates quite abruptly; interval 7 with a complete row of small subconical tubercles; tubercles bare, shiny, and without setæ. *Legs* with pale scaling; posterior tarsi rather narrow, setose, the joints of about the same width, second and third subequal, first much longer.

CAPE COLONY.

I have received a single example of this distinct species from my friend Dr. Walther Horn, of Berlin, and there are two others in the British Museum from Jekel's collection. Its only near ally is *H. rubifer*, F.; but this species lacks the lateral smooth spaces on the prothorax; the tubercles on the elytra are larger and further apart, the row on interval 5 is complete and not abruptly interrupted, and interval 2 always has a row of four or five large, depressed, and widely separated tubercles.

### *Hipporrhinus tricostatus*, sp. n.

Long. 13, lat. 6 millim.

*Head* convex, finely and dispersely punctured, forehead with a small central fovea; anteocular furrows shallow and ill-defined. *Rostrum* not incised at base, about as long as head and prothorax, deflexed and slightly curved. Upper surface without any furrow or carina, convex at base and faintly impressed towards apex, distinctly punctured except for a broad smooth central line; lateral sulci not meeting at base, which is continuous with forehead, the upper pair narrow but distinct, the lower pair almost obsolete; scrobes slightly curved, oblique and directed to beneath base of rostrum; inferior basal furrow absent. *Antennæ* with scape not reaching eye; the two basal joints of funicle subequal. *Prothorax* as long as broad, the length much greater than the width at base, which is about equal to that at apex, sides gradually but strongly dilated from apex and suddenly narrowed near base, broadest far behind middle, ocular lobes strongly developed. Upper surface plane, with a very high, narrow, central carina, and on each side of it a broad, smooth, strongly raised costa, the costæ uniting at apex so as to form an elongate horseshoe, the ends of which are sometimes interrupted near the base; outside the costa is a broad smooth space followed by a lateral row of small closely-set single tubercles, below which is a curved row of three larger tubercles forming the most prominent part of the lateral dilatation; tubercles and costæ black and shiny, interstices with brown scaling. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest rather before middle, apical processes in female very short but sharp. Upper surface convex, with rows of foveæ, those in adjoining rows often merging so as to give the elytra the appearance of being strongly wrinkled transversely: intervals 1, 4, and 6 entirely without tubercles; interval 2 with a short apical row of four or five sharply conical tubercles; interval 3 with a row of five or six larger subconical tubercles ceasing behind middle; intervals 5 and 7 with complete rows of conical tubercles, those on the former much larger and sharper near apex; tubercles black, shiny, and occasionally with short depressed apical setæ, interstices with uniform brown scaling. *Legs* with sparse pale scaling, forming a denser ring at apex of femora; posterior tarsi narrow, setose, the three basal joints of same width, second and third subequal, first longer.

CAPE COLONY.

I have seen only three examples of this striking species: two in the British Museum and one at Stockholm. The peculiar structure of the thorax will differentiate it from every other species in the genus, the nearest approach to it being found in such species as *canaliculatus*, Mshl., and *fictilis*, Mshl. But the sculpturing of the elytra is, however, very different from that in those species, being rather of the type found in *ferus*, Gyl., and its allies.

### *Hipporrhinus maculatus*, sp. n.

Long. 26, lat. 11 millim.

*Head* convex, closely shagreened on vertex, punctured in front, with a broad band of elongate yellow scales across forehead and running down in front of eye; forehead with a deep fovea near base of rostrum; anteocular furrows deep and complete, converging dorsally. *Rostrum* not incised at base, as long as head and prothorax, in profile the upper line is straight from base to near insertion of the antennæ, then sharply deflected. Upper surface broadly but very shallowly excavate throughout, with its edges strongly carinate from base to insertion of antennæ, with punctures and yellow scaling at the sides, and a broad, smooth, central line throughout; upper lateral sulci obsolete, the lower ones faint, filled with yellow scaling, and quite hidden from above by the lateral carina; scrobes directed beneath base of rostrum; inferior transverse basal furrow absent. *Antennæ* with dense yellow scaling; scape not quite reaching eye; the two basal joints of funicle subequal. *Prothorax* broader than long, length equal to width at base, apex narrower, sides strongly rounded, broadest about middle, ocular lobes moderately developed. Upper surface almost plane, sparsely covered with large flattened tubercles, leaving a central furrow containing a very short carina and a lateral smooth line on either side; prosternum and the three dorsal lines covered with yellow scaling, the rest bare. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest about middle, apical processes in female long and sharp. Upper surface convex, the striæ with more or less regular rows of large granules, the intervals unequally tuberculate: interval 1 with elongate depressed tubercles becoming smaller behind and vanishing before apex; intervals 2, 3, and 5 with closely-set, elongate, depressed tubercles to beyond middle, after which they become sharply conical to apex, those on interval 2 being the most prominent; intervals 4, 6, and 7 with smaller separated tubercles, depressed near base and conical towards apex; tubercles and granules quite bare and without setæ, the interstices with small patches of dense yellow scales, forming more or less regular rows of spots along the intervals. *Legs* with dense yellow scaling variegated with numerous bare black spots; posterior tarsi broad, spongy beneath, the joints subequal in length and breadth.

NATAL (*teste* Jekel: more probably Cape Colony).

I have seen only the unique type of this species in the British Museum. It is most nearly allied to *nivosus*, Sparrm., but also bears some resemblance to *insignis*, Fåhr. From both these species it may be distinguished owing to the upper surface of the rostrum having its edges sharply carinate right up to the base, but they are not raised into a sharp angle in front, as is the case with *nivosus*. This latter insect differs further in the presence on the rostrum of the inferior transverse basal furrow, and in the complete absence of tubercles on intervals 4 and 6 of the elytra. However, *maculatus* agrees with *nivosus*, and differs from *insignis*, in having the tubercles on interval 2 more prominent than those on 3.

### *Hipporrhinus lobatus*, sp. n.

Long. 23, lat. 10 millim.

*Head* convex, with scattered shallow punctures, vertex with dense scaling, forehead bare and with a central fovea; anteocular furrows distinct and complete. *Rostrum* not incised at base, about as long as head and prothorax, strongly curved, its upper edge in profile being in a continuous line with the forehead from base to middle, then very sharply deflexed, almost at a right angle. Upper surface convex at base, deeply excavate anteriorly, its edges being strongly raised in the form of angulated carinæ, punctures large, diffuse, and shallow, leaving a broad smooth central line; lateral sulci shallow and faint, the upper one very narrow and obsolescent; scrobes directed to beneath the base of rostrum; inferior basal furrow absent. *Antennæ* with dense brown scaling; scape not reaching eye; the two basal joints of funicle subequal. *Prothorax* transverse, the length about equal to the width at base, the apex narrower, sides moderately rounded, broadest about middle, ocular lobes strongly developed. Upper surface plane, diffusely set with large elevated rounded tubercles, leaving a broad central furrow containing a distinct short carina; tubercles and carina bare, interstices covered with large round whitish scales. *Elytra* oblong, sides subparallel to beyond middle, shoulders prominent but rounded, a strong impression about apex of fifth interval, apical processes in female short but sharp and divergent. Upper surface slightly convex, striæ with rows of small punctures with more or less distinct intervening granules, intervals uneven: interval 1 with a row of distant granules; interval 2 with an abbreviated row of tubercles from before middle to apex, those on disk small and rounded, those on declivity much larger and sharply conical; intervals 3, 5, and 7 with complete rows of small subconical tubercles, which become larger and more conical near apex; intervals 4 and 6 quite smooth. Tubercles bare and with short pale depressed setæ, interstices with thin brown scaling variegated with grey. *Legs* with dense pale scaling; posterior tarsi with the joints of about the same width, first a little longer than second, and second than third.

Cape Colony.

A distinct species, though clearly falling into the group represented by *ferus*, Gyl., and perhaps most nearly resembling *mammillatus*, Gyl.; but, apart from its much more elongate elytra, the strongly lobate edges of the rostrum will at once distinguish it.

### *Hipporrhinus brachyceroides*, sp. n.

Long. 22, lat. 9 millim.

*Head* convex, without any central carina or fovea; the punctuation hidden by very dense brown scaling, anteocular furrows distinct. *Rostrum* not incised at base, as long as head and thorax, strongly curved; at base a large stout double horn, the apices of which are divergent. Upper surface with a broad central furrow throughout and thickly covered with large whitish scales. The lateral sulci are broad and distinct, coarsely punctured and filled with scales; the interval between them narrowly carinate; the basal transverse furrow beneath very deep; scrobes directed below base of rostrum. *Antennæ* black, setose; scape not reaching eye; first and second joints of funicle subequal. *Prothorax* as long as broad, apex narrower than base, sides very little rounded, broadest about middle, ocular lobes very strongly developed. Upper surface convex, irregularly set with conical tubercles, leaving a broad central furrow containing a short but strong carina; apices of tubercles bare, each with a puncture containing a depressed seta, interstices with dense variegated scaling. *Elytra* oblong, shoulders prominent, sides subparallel for three-fourths of the length, apical processes very short. Upper surface convex, with regular rows of shallow foveolæ: interval 1 entirely devoid of granules or tubercles; interval 6 with a more or less abbreviated row of tubercles, sometimes wanting; the remaining intervals with regular, complete rows of small, conical, closely-set tubercles—except that on interval 4, which ceases at the summit of the declivity; the tubercles increase slightly in size towards apex, being subcristate on the declivity of the second interval. The entire surface, including the apices of the tubercles, is densely clothed with variegated grey and brown scaling. *Legs* short and thick, densely clothed with light-coloured scales and setæ; second and third joints of posterior tarsi subequal, distinctly shorter than first, all three of about equal width.

Cape Colony: Namaqualand.

A very distinct species, approaching the aberrant *Dregei*, Gyl., but, apart from being smaller and of a different colour, the rostral horn is much larger and the apices divergent; the thoracic tubercles are smaller, more conical, and more closely set; the prosternum has a strong conical projection just in front of the anterior coxæ; the large intra-apical tubercular prominence of *Dregei* is represented only by a very slight elevation in *brachyceroides*. The prosternal projection is, so far as I am aware, unique in the genus, although *rubifer*, F., and some of its allies have a slight fold in the same position.

### *Hipporrhinus oaxus*, sp. n.

Long. 23–24, lat. 8½–9 millim.

*Head* convex, bare, punctuation close but faint on vertex, deeper and more scattered in front; forehead rather retuse, with two faint rounded impressions; anteocular furrows distinct. *Rostrum* cut off from head by a deep dorsal incision, almost as long as head and thorax, distinctly curved, subparallel from base to beyond middle, then gradually dilated to apex. Upper surface convex and without central furrow or carina in basal half, shallowly excavate towards apex, the basal part smooth shiny and with fine sparse punctuation, the punctures much closer and deeper near apex; lateral sulci strong and deep, the intervening carina rather narrow and undulating, the lower pair longer, the upper pair scarcely uniting at base; scrobes lateral, parallel with sulci; inferior basal furrow very broad and deep. *Antennæ* with scape just reaching eye; second joint of funicle longer than the first in male, subequal in female. *Prothorax* rather broader than long, apex about as broad as base, which is equal to the length in female, but narrower in male, sides distinctly rounded, broadest about middle, ocular lobes strongly developed. Upper surface slightly convex, fairly closely set with large elevated rounded tubercles bearing depressed setæ, central furrow narrow and without a carina; no scaling. *Elytra* oblongo-ovate, shoulders rounded, but more prominent in female, sides slightly rounded, broadest before middle, apices slightly and bluntly projecting in male, with sharp parallel processes in female 1 millim. long. Upper surface convex, the dorsal striæ simply punctate, the outer ones granulate, the intervals not equally prominent: interval 1 quite smooth to near declivity, but with strong granules from there to apex; interval 2 quite smooth throughout; 3, 5, and 7 with tubercles strongly depressed to beyond middle, then sharply conical, those on 3 being especially prominent and continued right on to the apical processes in both sexes; intervals 4 and 6 with rows of depressed tubercles ceasing beyond middle; tubercles almost entirely devoid of setæ, the elytra bare and with a strong dull bronze reflexion. *Legs* shiny, tibiæ and tarsi setose; femora finely punctured at base, impunctate in middle, and very coarsely punctured at apex; the posterior and anterior tibiæ strongly curved in male, but especially the former; joints 2 and 3 of posterior tarsi subequal, the first a little longer.

Cape Colony.

This species is certainly a very close ally of *H. verrucosus*, L., but as the fourteen examples which I have examined all retain their distinctive characters, it seems advisable to regard it as a distinct species, at least provisionally. I retain for it Buquet's collection name under which it already stands in all the older collections. The chief points in which it differs from Linné's species are:—(1) the absence of the deep central furrow on the rostrum; (2) the lower lateral sulcus is distinctly longer than the upper and parallel with it, whereas in *verrucosus* it is shorter and the sulci converge apically; (3) the thoracic tubercles are more elevated; (4) the discal punctures on the elytra are deep and simple, whereas in *verrucosus* they are shallow and with a small but distinct granule at the side of each; (5) the discal portions of the intervals 1 and 3 near the base are quite plane and smooth, and not distinctly tuberculate or carinate.

[To be continued.]

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## LVIII.—*The Specific Name of the Okapi presented by Sir Harry Johnston to the British Museum.* By E. RAY LANKESTER, M.A., LL.D., F.R.S., Director of the Natural History Department of the British Museum.

SINCE it appears probable (according to Dr. Forsyth Major's observations) that the skin of the Okapi received in Brussels in May last belongs to a species of the genus *Okapia* distinct from that represented by the entire skin and skull (the larger of the two skulls) sent home by Sir Harry Johnston in the previous year, and now mounted and exhibited in the public gallery of the Museum, and since, moreover, according to Dr. Forsyth Major's observations, the "bandoliers" of striped skin sent home by Johnston at a still earlier date, and named *Equus Johnstoni* by Sclater, belong to the species received in Brussels in May 1902, and not to the species represented by the entire skin and skull sent by Johnston in 1901, it becomes necessary to assign a new name to the latter. This is the skin figured and described in my memoir in the Trans. Zool. Soc. 1902 (vol. xvi.): the larger of the two skulls and the lower jaw there described and figured belong to it. I propose to call this species after the Belgian officer Mr. Eriksson, who obtained it at Sir Harry Johnston's request, as recorded in my memoir above cited. This species will therefore stand as *Okapia Erikssoni*, Lankester. The type is the stuffed skin, skull, and lower jaw now in the Natural History Museum, London. The type of *Okapia Johnstoni*, Sclater, namely the two pieces of skin ("bandoliers") from the hind limbs, is also preserved in this Museum.

Certainty as to the distinctness of these two species and a complete diagnosis of their characters, if they should prove to be, as now supposed, distinct, can only be based on the examination of a large series of specimens.

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*Palæontologia Indica.* New Series. Vol. I. Part 3. *Fauna of the Miocene Beds of Burma.* By Fritz Noetling, Ph.D., F.G.S., Palæontologist, Geological Survey of India. Folio. 378 pages, 25 plates. Calcutta: Geol. Survey Office. London: Kegan Paul & Co. 1901.

The author explains that the fossils here described, besides including those collected by himself from the Irrawadi series and other beds, comprise some collected by the late Mr. Grimes and others by Messrs. Theobald and Fedden in Lower Burma some thirty years ago. He found that the want of any reliable literature on Burmese palæontology was not relieved by any of the published works on Indian fossils. The corals and echinoids are too rare in Burma for Duncan and Sladen's monographs on those of Western India to be of service, and Sowerby's descriptions of Cutch fossils are not sufficiently distinct. The memoir on the fossils of the Nummulitic group of Sind by d'Archiac and Haime he found to be "worse than useless," the fossils of different formations being confused. The type fossils require to be revised and carefully compared with others of authenticated horizons.

Martin's 'Tertiärschichten auf Java,' however, has been of great use to him; and, following Stoliczka's suggestion that the fauna of the Burmese Tertiary System should be compared with the living fauna of the Indian Ocean, F. Noetling has been able, thanks to Major Alcock, to study the great collection in the Indian Museum with highly satisfactory results.

Thus a new line of research has been opened out in the study of the Indian Tertiary System, affording some highly interesting "views regarding not only the origin of the recent fauna of the Indian Ocean, but also of the relation the Miocene of India-Burma had with the older Tertiary System of Europe and the recent fauna of the Western Pacific. In fact, I think that one of the most important of my results," says Mr. Noetling, "is the proof of a migration of species from Europe in an eastern direction, which commenced with the Eocene and probably lasted through the Miocene—a migration which still continued in an eastern direction during the Miocene period in India-Burma, though all direct communication between the Miocene Ocean of Europe and India was disconnected during the Miocene period."

In subdividing the Tertiary System of Burma the author finds that the Upper or Irrawaddi (Pliocene) Series contains the remains of land and freshwater (fluviatile) life, and is based on a conglomerate containing numerous fossil bones, such as those of *Hippotherium* and *Acerotherium.*

(It was on an exposed ledge of this conglomerate that Mr. Noetling discovered, in association with a fossil tooth of *Hippotherium antelopinum*, the stone implement described in 'Natural Science,' vol. x. no. 62, p. 234, 1897.)

The Lower or Arrakan (Miocene) Series in its subdivisions comprehends:—(1) The Upper or Pegu division (Miocene), no Nummulites; (2) The Middle or Bassein division, with Nummulites (Eocene); (3) The Lower or Chin division, without Nummulites (Eocene or Cretaceous ?). It is noted that the geology and fossils of the Pegu division have been best known and that those of the Bassein and Chin divisions have not been so closely collected and studied. The Pegu division comprises:—(1) The Yenangyoungian beds, marine, largely littoral, and partly estuarine; and (2) The Promean, of estuarine origin, with its petroleiferous strata.

The description and corollation of the formations and their zones in Lower Burma (pages 17–26) and in Upper Burma (pages 27–38) are followed by tables of the vertical and zonal distribution of the fossil molluscan fauna (pages 19–53). Two hundred and eight species, including some varieties, besides indeterminate forms, are described at pages 101–378.

The relationships of wide territorial types, namely, (1) the Gallic, Pacific, and Mediterranean groups of Palæogene species, and (2) the Identical, Subidentical, and Evolutionary Neogene species (page 98), are defined, and their proportions stated.

The proofs are given of an Eastern migration of European species, assumed by the late H. M. Jenkins in 1864 to have proceeded in Miocene times, but by F. Noetling (in the work before us) as having been in the Eocene period. This extensive subject is carefully and philosophically treated at pages 39–100, and elucidated with elaborate successional and statistical tables.

Noetling agrees with Martin that there is no evidence to warrant the adoption of "Oligocene" for any part of the Indian Tertiary System resting on that regarded as Eocene, whether in Baluchistan, Western India, Burma, Java, Sumatra, or Borneo.

*Biologia Centrali-Americana.—Hemiptera-Heteroptera.* Vol. II. By G. C. Champion. Pp. xvi & 416. With 22 plates. London, 1897–1901.

The first part of this work, comprising the families Pentatomidæ, Coreidæ, Lygæidæ, Pyrrhocoridæ, and Capsidæ, and elaborated by Mr. Distant, was finished in 1893. The remaining nineteen families of the Heteroptera are worked out by Mr. Champion in the present volume, which includes 592 species—no less than 289 being new, with 30 new genera. With the species enumerated in Vol. I. the total number of Heteroptera recorded in the 'Biologia' is 1715, rather more than half of which have been treated as new.

Mr. Champion's work is not only faunistic, it is much more. The descriptions are excellent, and there is scarcely one among the nineteen families dealt with, not excepting the Aradidæ and Anthocoridæ, in which the author has not succeeded in finding new, hitherto overlooked characters for distinguishing the species. The sexual characters are carefully noted, and in nearly every genus in more than one of the species. The enumeration of the latter is in most cases preceded by a synoptical table, much facilitating their determination.

Mr. Champion is to be congratulated on having so successfully completed this work. the most important contribution to Hemipterological literature published during the last few years.

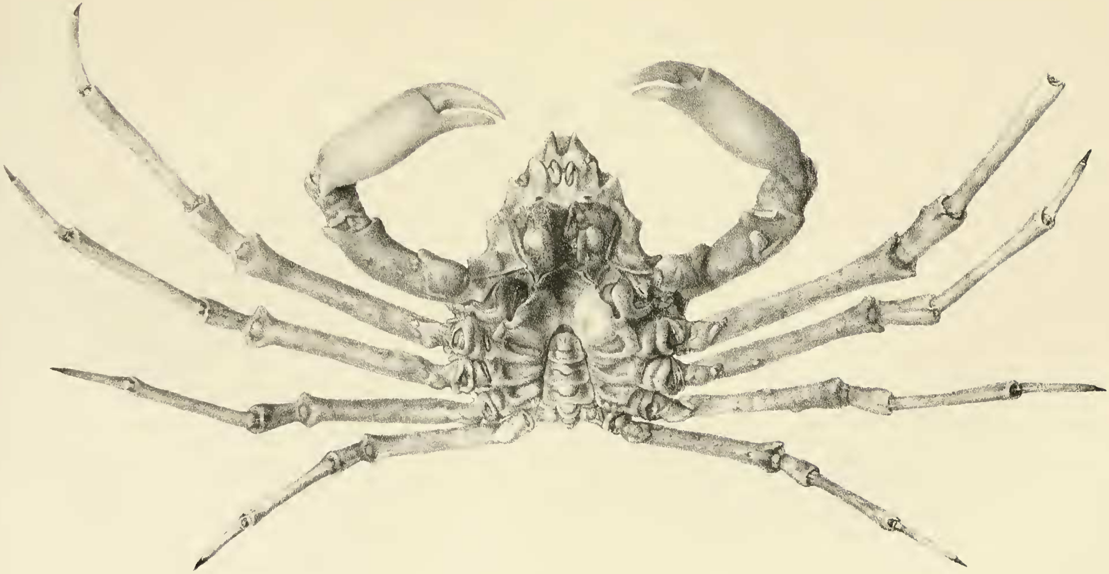
E. Bergroth.

Gephyrocrinus Grimaldii, *Crinoïde nouveau provenant des campagnes de la 'Princesse Alice.'* By R. Koehler and F. A. Bather. Mém. Soc. Zool. France, xv. pp. 68–79, 4 text-figures. July 1902.

The specimen herein described was dredged by the Prince of Monaco at a depth of 1786 metres near Hierro in the Canaries, and not, as the authors state, " dans les parages des Açores." It is referred to the Hyocrinidæ, a family represented until recently by a single species, *Hyocrinus Bethellianus*, dredged by the 'Challenger.' A second species, not yet described, was found by the 'Valdivia' near Enderby Land, in the Antarctic. The present specimen is therefore of great interest, all the more so since it is considered to form the type of a new genus differing from *Hyocrinus*, and, indeed, from all known crinoids, in the fact that the food-grooves are carried across from the fourth brachials to the orals on a thin unplated membrane stretching like the web of a duck's foot between each arm and the tegmen. The name *Gephyrocrinus* is suggested by this resemblance to a suspension bridge. Minor points of distinction from *Hyocrinus* are the fusion of the basals, the greater thickness of the cup-plates, the almost complete atrophy of the ambulacrals, and the form of the pinnules, which have not the peculiar arrangement characteristic of *Hyocrinus*. These differences have induced the authors to give a fresh diagnosis of the Hyocrinidæ, differing considerably from that in the 'Challenger' Report.

Although the unique specimen of *G. Grimaldii* is small, somewhat imperfect, and naturally cannot be sacrificed for minute dissection, it has been found possible to give a very exact description of all the details of its external anatomy. These have suggested to one of the authors a renewed investigation of the type of *Hyocrinus Bethellianus*, with results that may be published more fully elsewhere.

Ann. & Mag. Nat. Hist. S. 7. Vol. X. Pl. VII.



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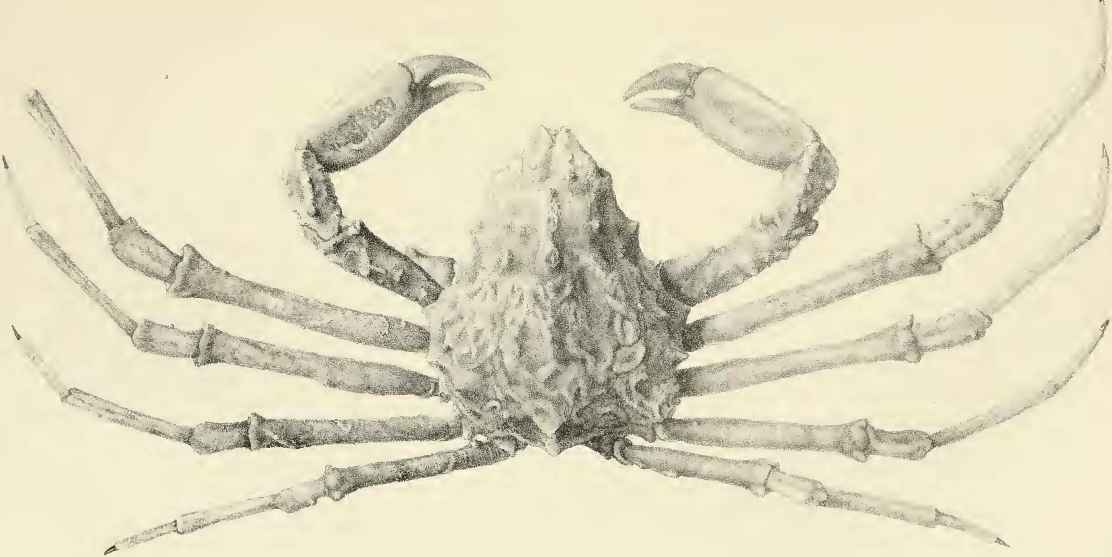
Ann. & Mag. Nat. Hist. S. 7. Vol. X. Pl. VIII.



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# THE ANNALS

AND

# MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 60. DECEMBER 1902.

## LIX.—*Descriptions of new Fishes from the Collection made by Mr. E. Degen in Abyssinia.* By G. A. Boulenger, F.R.S.

The splendid collection of Abyssinian fishes brought home by Mr. E. Degen is one of exceptional interest from the fact that it contains examples of every one of the species described by Rüppell in 1835 *, of which only some of the types are preserved, in a dry condition, in the Senckenberg Museum at Frankfort a. M., and which had not been rediscovered since the expedition of that illustrious zoologist and traveller; and that it has brought to our knowledge the existence in those waters of a Loach, a group of which no African representative was on record, and of an astonishing multiplicity of species of the genus *Barbus*, as well as of two new Silurids of the genus *Clarias*. Twenty-one species are here described as new; fifteen of these belong to the section of which the Nilotic *Barbus bynni* is the type and of which representatives are known to occur in East and South Africa and in the great Central African lakes. The study of these fishes is a bewildering one from the very close affinity which connects them, as I have already pointed out in a recently published paper dealing with the collection made by Mr. Hinde in the Kenia district[*]; and nothing short of the large series (about 350 specimens) got together by Mr. Degen could have enabled me to estimate correctly, as I believe, the value of the characters which have been regarded by some authors as generic, whilst by others they have been refused even specific importance. Thus, the character on which Rüppell founded his genus *Labeobarbus*, though insufficient for generic separation, is of the greatest value for the distinction of species, as I have ascertained that it is not sexual nor dependent on age in the Abyssinian fishes, since the lips are as much produced in a *Barbus* (*Labeobarbus*) *nedgia* of 6½ inches as in one of 20. The idea expressed by Günther a few years ago[†], that adult specimens of *Barbus intermedius* have the lips more developed, is not supported by the evidence available at present, and is clearly the result of an error of determination, since the largest specimen named "*Barbus intermedius*, Rüppell," from East Africa[‡], on which this view is founded, measures only 9½ inches, whilst the type of *B. intermedius* from Lake Tsana[§], for the loan of which I am indebted to the kindness of the Directors of the Senckenberg Museum, measures 13 and lacks the mental lobe.

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* The material now available shows *Varicorhinus beso*, Rüpp., to be the same as the fish since described as *Chondrostoma Dilloni*, C. & V. *Gobio quadrimaculatus*, Rüpp., should bear the name *Crossochilus quadrimaculatus*, and *Chondrostoma dembeensis*, Rüpp., that of *Discognathus dembeensis*. *Gobio hirticeps*, Rüpp., is not the male of *G. quadrimaculatus*, as suggested by Rüppell, but of *D. dembeensis*, the eye being situated in the posterior half of the head.

It is extremely surprising how fishes, agreeing completely in the form and scaling of the body and in the position and structure of the fins, in the pharyngeal teeth, and also in the skeleton, so far as I have been able to ascertain, may differ very considerably in the proportions of the various parts of the head, the form and development of the lips, and the relative length of the barbels. I trust that the rich material which I have had the privilege of studying has enabled me, through comparisons of numerous specimens of all sizes, to form a more correct estimate of the changes that take place with age, and that the number of species has not been unduly multiplied, although it is, of course, quite possible that some of them are founded on hybrids. In order to facilitate the discrimination of the species of the *Barbus bynni* group here described as new, I append a tentative synopsis of all the African species of that group, one of the most difficult with which it has ever been my lot to deal.

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[*] P. Z. S. 1902, ii. p. 221.

[†] P. Z. S. 1894, p. 91.

[‡] I propose the name *Barbus Gregorii* for the species referred by Günther to *B. intermedius*, from which it differs in the much-developed lower lip with a rounded median lobe, and in the longer barbels, the anterior measuring $1\frac{1}{2}$ to $1\frac{3}{4}$, the posterior $1\frac{2}{3}$ to 2 diameters of the eye. D. IV 8–9; A. III 5; Sc. 31–33 $\frac{5\frac{1}{2}-6\frac{1}{2}}{5\frac{1}{2}}$. In its smaller scales, of which three series intervene between the lateral line and the ventrals, it differs from the other allied species of the Tana system (*B. tanensis*, Gthr., *Hindii*, Blgr., *perplexicans*, Blgr., *labiatus*, Blgr.); in these the number of scales is 25–30 $\frac{4\frac{1}{2}-5\frac{1}{2}}{4\frac{1}{2}}$, 2 between the lateral line and the ventrals, and the number of branched dorsal rays is 9 or 10. A specimen from the Gota River, in the Degen collection, appears to be referable to *B. Gregorii.*

[§] Often written "Tana" on modern maps. I think it desirable to retain the old orthography, in order to avoid confusion with the system of the Tana River further south in East Africa, the fishes of which have much in common with those of the great Abyssinian lake which is the source of the Blue Nile.

Mr. Degen deserves great credit for the manner in which he has collected and preserved in spirit this large and well-selected series of fishes—some as much as 2 feet in length—accompanied by notes and coloured sketches made by him on the spot, which have been of great assistance to me.

The altitude of the localities mentioned in this paper are only approximative, Mr. Degen not having been in a position to determine them with precision.

### *Synopsis of the African Species of* Barbus *related to* B. bynni, *Forsk.*

Dorsal fin with a very strong, bony, non-serrated spine and 8 to 10 branched rays; anal with 5 branched rays *; scales large, 40 or less in the lateral line; barbels four.

A. Sc. 33-40 $\frac{6\frac{1}{2}-7\frac{1}{2}}{5\frac{1}{2}-6\frac{1}{2}}$ 4 †; D. IV 8-9; lower lip continuous across the chin.

Sc. 40 $\frac{7\frac{1}{2}}{6\frac{1}{4}}$; barbels not longer than eye; interorbital width 3 times in length of head; lower lip not forming a median lobe...... *B. microterolepis*, Blgr., [p. 426.

Sc. 32-37 $\frac{6\frac{1}{2}}{6\frac{1}{2}}$; barbels 2 to $2\frac{1}{2}$ diameters of eye; interorbital width $2\frac{3}{4}$ to 3 times in length of head; lower lip with a median lobe.... *B. macronema*, Blgr., [p. 427.

Sc. 33-36 $\frac{6\frac{1}{2}}{5\frac{1}{2}-6\frac{1}{2}}$; barbels $1\frac{1}{2}$ to 2 diameters of eye; interorbital width 3 to $3\frac{1}{3}$ times in length of head; lower lip not forming a median lobe ......................... *B. Rueppelli*, Blgr., [p. 427.

Sc. 36-39 $\frac{6\frac{1}{2}}{6\frac{1}{2}}$; barbels not or but slightly longer than eye; interorbital width $2\frac{3}{4}$ to 3 times in length of head; dorsal fin nearer caudal than occiput .......................... *B. Holubi*, Stdr.

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* This character excludes the Moroccan species, which agree with the East-African ones in the structure of the dorsal fin, but have 6 or 7 branched rays in the anal.

† The figure or figures after the numbers in the transverse series refer to the series of scales between the lateral line and the ventral fin.

B. Sc. 30–38 $\frac{5\frac{1}{2}-6\frac{1}{2}}{4\frac{1}{2}-5\frac{1}{2}}$ $2\frac{1}{2}$–3; D. III–IV 8–9.

1. Lower lip not continuous across the chin.
   *a.* Mouth inferior, evenly curved.
      *α.* Anterior barbel $1\frac{1}{3}$ to $1\frac{1}{2}$, posterior $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters of eye; interorbital width $2\frac{1}{2}$ to 3 times in length of head.

Depth of body $2\frac{2}{3}$ to 3 times in total length; snout less than $\frac{1}{3}$ length of head ........ *B. surkis*, Rüpp.

Depth of body more than 3 times in total length; snout more than $\frac{1}{3}$ length of head ........ *B. Harringtoni*, Blgr., [p. 428.

*β.* Barbels not more than $1\frac{2}{5}$ diameters of eye.

* Ventrals not in advance of origin of dorsal; interorbital width $2\frac{1}{2}$ to 3 times in length of head.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length; snout rounded, not more than $1\frac{1}{2}$ diameters of eye, which is 3 times in length of head .. *B. jarsinus*, Blgr., [p. 429.

Length of head $3\frac{3}{4}$ to $4\frac{1}{2}$ times in total length; snout rounded, not twice as long as eye, which is more than 3 times in length of head .................................. *B. intermedius*, Rüpp.

Length of head 4 to $4\frac{1}{2}$ times in total length; snout rather pointed, nearly twice as long as eye in the adult .................... *B. Fergussonii*, Blgr.

** Ventrals anterior to origin of dorsal.

Interorbital width $2\frac{1}{2}$ times in length of head .. *B. Eduardianus*, Blgr.

Interorbital width more than 4 times in length of head .............................. *B. Breyeri*, M. Weber.

*b.* Mouth inferior, forming a broken arch, a feebly curved transverse line in front; lips very feebly developed; barbels not longer than eye ...... *B. plagiostomus*, Blgr., [p. 429.

*c.* Mouth terminal; anterior barbel not longer than eye.

Interorbital width $2\frac{3}{4}$ to 3 times in length of head; posterior barbel $1\frac{1}{4}$ to $1\frac{2}{5}$ diameters of eye ................................ *B. platystomus*, Blgr., [p. 430.

Interorbital width $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head; posterior barbel not longer than eye. *B. gorguari*, Rüpp. †

2. Lower lip continuous across the chin, sometimes produced into a median lobe.
   *a.* Spine of dorsal fin as long as or longer than head; interorbital width $2\frac{1}{2}$ to 3 times in length of head.

Snout strongly projecting beyond lower jaw; anterior barbel not or but slightly longer than eye; depth of body $2\frac{2}{3}$ to $3\frac{1}{3}$ times in total length .......................... *B. bynni*, Forsk.

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† *B. elongatus*, Rüpp., cannot be separated from *B. gorguari*.

Snout feebly projecting; anterior barbel $1\frac{1}{2}$ as long as eye; depth of body $3\frac{1}{2}$ times in total length .......................... *B. kassamensis*, Blgr., [p. 431.

Snout feebly projecting; anterior barbel a little shorter than eye; depth of body $3\frac{2}{3}$ to 4 times in total length .................. *B. gananensis*, Vincig.

*b.* Spine of dorsal fin shorter than head; depth of body $3\frac{1}{3}$ to $4\frac{1}{3}$ times in total length.

*a.* Anterior barbel shorter than eye, posterior as long as eye or a little longer; interorbital width $3\frac{1}{5}$ to $3\frac{3}{4}$ times in length of head.

Length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times in total length.. *B. brevibarbis*, Blgr., [p. 431.

Length of head 4 to $4\frac{1}{4}$ times in total length .. *B. leptosoma*, Blgr., [p. 432.

*β.* Anterior barbel at least as long as eye.

* No subtriangular dermal lobe above the mouth.

† Interorbital width $2\frac{1}{2}$ to 3 times in length of head.

‡ Anterior barbel not or but slightly longer than eye.

Posterior barbel $1\frac{1}{4}$ to $1\frac{1}{3}$ diameters of eye; depth of body equal to length of head; snout 3 times in length of head ................ *B. oreas*, Blgr., p. 432.

Posterior barbel not or but slightly longer than eye; depth of body nearly equal to length of head; snout more than 3 times in length of head .............................. *B. altianalis*, Blgr.

‡‡ Anterior barbel at least nearly $1\frac{1}{2}$ as long as eye.

Posterior barbel about $1\frac{1}{2}$ diameters of eye; depth of body equal to length of head .... *B. marequensis*, [A. Smith.

Posterior barbel $1\frac{2}{3}$ to $1\frac{3}{4}$ diameters of eye; depth of body greater than length of head ...... *B. Duchesnii*, Blgr., [p. 433.

Posterior barbel $1\frac{2}{3}$ diameters of eye; depth of body equal to length of head; a subtriangular mental lobe...................... *B. mento*, Blgr., p. 434.

†† Interorbital width $3\frac{1}{4}$ to $3\frac{1}{3}$ times in length of head; anterior barbel $1\frac{1}{2}$ to $1\frac{3}{4}$, posterior $1\frac{2}{3}$ to 2 diameters of eye.

Ventrals below origin of dorsal.............. *B. Gregorii*, Blgr.

Ventrals posterior to origin of dorsal ........ *B. hursensis*, Blgr, [p. 434.

††† Interorbital width $3\frac{1}{2}$ to 4 times in length of head; barbels 1 to $1\frac{1}{2}$ diameters of eye. *B. affinis*, Rüpp.

** A subtriangular dermal lobe above the upper jaw; posterior barbels not more than $1\frac{2}{3}$ diameters of eye; interorbital width $3\frac{1}{4}$ to $3\frac{3}{4}$ times in length of head.

Lips not produced into long triangular median

lobes, but snout with a projecting dermal flap ........................ *B. Degeni*, Blgr., p. 435.
Both lips produced into long triangular median lobes ........................ *B. nedyia*, Rüpp.

C. Sc. $25\text{–}30\ \frac{4\frac{1}{2}\text{–}5\frac{1}{2}}{4\frac{1}{2}}\ 2$; D. IV 8–10.

1. Lower lip continuous across the chin; both upper and lower lips produced into triangular median lobes; anterior barbel as long as eye, posterior a little longer ........................ *B. labiatus*, Blgr.
2. Lower lip interrupted on the chin.
   *a.* Mouth without horny sheath.
Anterior barbel $1\frac{1}{3}$ to $1\frac{2}{3}$ diameters of eye, posterior $1\frac{2}{3}$ to 2 ........................ *B. tanensis*, Gthr.
Anterior barbel about as long as eye, posterior $1\frac{1}{4}$ to $1\frac{1}{2}$ diameters of eye .............. *B. Hindii*, Blgr.
Barbels shorter than eye .................. *B. oxyrhynchus*, Pfeff.
   *b.* Lower jaw with a trenchant horny edge; barbels as long as eye, or posterior a little longer .......... *B. perplexicans*, Blgr.

### *Barbus microterolepis.*

Depth of body equal to length of head, $3\frac{4}{5}$ times in total length. Snout rounded, $3\frac{1}{3}$ times in length of head; diameter of eye 4 times in length of head, interorbital width 3 times; mouth terminal, its width $4\frac{1}{2}$ times in length of head *; lips moderately developed, the lower continuous; barbels two on each side, anterior $\frac{3}{4}$ diameter of eye, posterior as long as eye, the distance between them $\frac{3}{5}$ diameter of eye. Dorsal IV 8, last simple ray strong, bony, not serrated, slightly curved, a little shorter than head; free edge of the fin strongly emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ length of head. Pectoral $\frac{3}{4}$ length of head, not reaching ventral; latter a little posterior to origin of dorsal. Caudal peduncle $1\frac{2}{3}$ as long as deep. Scales $40\ \frac{7\frac{1}{2}}{6\frac{1}{2}}$, 4 between lateral line and ventral, 16 round caudal peduncle. Olive above, silvery beneath; fins greyish.

Total length 135 millim.

A single specimen was obtained at Buggali, from the Maki River, a fast-running stream flowing towards Lake Swai from the eastern slope of the Adami Mountains, in the Addia country, altitude about 4000 feet, March 3, 1902, together with examples of *Barbus affinis*, Rüpp.

This species is remarkable in having the smallest scales among the numerous allies of *Barbus bynni*, Forsk.

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* *I. e.*, the greatest width of the closed mouth, the lips being lifted if necessary, and not included.

### *Barbus macronema.*

Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length, length of head $3\frac{1}{2}$ to 4 times. Snout rounded, $3\frac{1}{4}$ to $3\frac{1}{3}$ times in length of head; diameter of eye 6 to $6\frac{1}{2}$ times in length of head, interorbital width $2\frac{3}{4}$ to 3 times; mouth inferior, its width $3\frac{1}{4}$ to 4 times in length of head; lips well developed, the lower with a very short, rounded or truncate median lobe; barbels two on each side, nearly equal, 2 to $2\frac{1}{2}$ diameters of eye, $1\frac{3}{4}$ to $2\frac{1}{4}$ as long as the distance between them. Dorsal IV 8, last simple ray strong, bony, not serrated, feebly curved, about $\frac{1}{2}$ length of head; free edge of the fin emarginate; its distance from the occiput equal to or a little less than its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ to $\frac{3}{4}$ length of head, reaching root of caudal, or a little beyond. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head, not reaching ventral; latter below origin of dorsal. Caudal peduncle $1\frac{1}{2}$ as long as deep. Scales 32–37 $\frac{6\frac{1}{2}}{6\frac{1}{2}}$, 4 between lateral line and ventral, 12 or 14 round caudal peduncle. Olive above, yellowish beneath; fins greyish.

Five specimens measuring 260 to 365 millim.: one was obtained at Gafersa, in the Maki River, altitude about 5000 feet, March 11, 1902; two were procured together at Dedota, altitude about 5500 feet, in the Hawash River, March 16, 1902; and two are from the Hurso River, a fast-running mountain-stream flowing northwards in the Upper Adal country, altitude about 7000 feet, Jan. 17, 1902.

This species has much in common with *B. Gregorii*, Blgr., but differs in the longer barbels and the presence of four series of scales between the lateral line and the ventral fins.

### *Barbus Rueppelli.*

Depth of body equal to length of head, $3\frac{1}{2}$ to $3\frac{4}{5}$ times in total length. Snout broad, rounded, 3 or $3\frac{1}{4}$ times in length of head; diameter of eye $4\frac{1}{2}$ (young) to $6\frac{1}{2}$ times in length of head, interorbital width 3 to $3\frac{1}{3}$ times; mouth inferior, its width 4 times in length of head; lips broad, continued across the chin, but not forming a median lobe; barbels two on each side, anterior $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters of eye, posterior $1\frac{3}{4}$ to 2, the distance between them equal to or a little exceeding diameter of eye. Dorsal IV 8, last simple ray strong, bony, not serrated, feebly curved, $\frac{2}{5}$ to $\frac{2}{3}$ length of head; free edge of the fin emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ length of head, reaching root of caudal or a little beyond. Pectoral

$\frac{3}{4}$ to $\frac{4}{5}$ length of head, not reaching ventral; latter below or slightly posterior to origin of dorsal. Caudal peduncle $1\frac{1}{3}$ to $1\frac{1}{2}$ as long as deep. Scales 33–36 $\frac{6\frac{1}{2}}{5\frac{1}{2}-6\frac{1}{2}}$, 4 between lateral line and ventral, 12 or 14 round caudal peduncle. Greenish above, golden on the sides and below; fins yellowish green.

Five specimens, measuring from 180 to 340 millim., from the Errer River, a mountain-stream flowing northwards from the Jebel-Ambar range of mountains, in the Upper Adal country, altitude about 4000 feet, Jan. 20, 1902.

This new species, named in memory of the first explorer of the Abyssinian fish-fauna, is distinguished from the preceding in the shorter barbels and the continuous lower lip, which is not notched on each side to form a median lobe.

### *Barbus Harringtoni.*

Depth of body equal to length of head, $3\frac{1}{2}$ times in total length. Snout rounded, a little more than $\frac{1}{3}$ length of head; diameter of eye 8 times in length of head, interorbital width 3 times; mouth large, subinferior, its width 3 times in length of head; lips moderately developed, interrupted on the chin; barbels two on each side, anterior $1\frac{1}{3}$, posterior $1\frac{1}{2}$ diameters of eye and as long as the distance between them. Dorsal IV 9, last simple ray strong, bony, not serrated, feebly curved, nearly $\frac{1}{2}$ length of head; free edge of the fin emarginate; its distance from the occiput equal to its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ length of head, nearly reaching root of caudal. Pectoral $\frac{4}{5}$ length of head, not reaching ventral; latter below origin of dorsal. Caudal peduncle $1\frac{1}{2}$ as long as deep. Scales 34 $\frac{5\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Olive above, whitish beneath; fins greyish.

Total length 500 millim. Stated by Mr. Degen to reach double that length.

A single specimen from the Hawash River at Warrar, altitude about 4000 feet, Feb. 6, 1902.

This large Barbel, named in honour of Col. J. L. Harrington, C.B., C.V.O., H.B.M. Consul General at the Court of the Emperor Menelek, is nearly related to *B. surkis*, Rüpp., from which it differs in the less deep body, the longer snout, the larger mouth, and the shorter barbels. The lower pharyngeal bones are much less massive, smaller in fact in this type than in a smaller *B. surkis*; the anterior pharyngeal teeth of the inner row have compressed mammiform crowns instead of the subspherical form assumed by them in *B. surkis*.

### *Barbus jarsinus.*

Depth of body equal to length of head, $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length. Snout rounded, 3 times in length of head; diameter of eye $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head, interorbital width 3 times; mouth inferior, its width 4 times in length of head; lips moderately developed, the labial fold not extending across the chin; barbels two on each side, anterior $\frac{3}{4}$ to 1 diameter of eye, posterior 1 to $1\frac{1}{4}$, the distance between them $\frac{1}{2}$ to $\frac{3}{5}$ diameter of eye. Dorsal IV 9 (rarely 8), last simple ray strong, bony, not serrated, straight, $\frac{2}{3}$ to $\frac{3}{4}$ length of head; free edge of the fin feebly emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as deep. Scales 31–34 $\frac{5\frac{1}{2}}{4\frac{1}{2}-5\frac{1}{2}}$, $2\frac{1}{2}$ or 3 between lateral line and ventral, 12 or 14 round caudal peduncle. Olive-brown above, silvery on the sides and below; a darker streak along each side of the back; axil of pectoral and of ventral and base of anal bright orange.

Total length 115 millim.

Numerous specimens of this small Barbel were obtained on Jan. 13, 1902, in the Jerrer or rapid mountain-stream five hours' ride from Harrar, flowing from Mount Jarso to the Webi Shebeli, altitude about 6000 feet.

This species is most nearly related to *B. intermedius* of Rüppell. Compared with young specimens (120 millim. long) of the latter, it differs in the longer snout, the smaller eye, the narrower interorbital region, and the shorter dorsal spine.

### *Barbus plagiostomus.*

Depth of body $3\frac{1}{2}$ to 4 times in total length, length of head 4 to $4\frac{1}{2}$ times. Snout rounded, 3 or $3\frac{1}{3}$ times in length of head; diameter of eye $4\frac{1}{2}$ to 5 times in length of head, interorbital width $2\frac{1}{2}$ to $2\frac{2}{3}$ times; mouth inferior, forming a broken arch, a feebly curved transverse line in front, its width 3 or $3\frac{1}{3}$ times in length of head; lips very feebly developed, confined to the sides; a thin horny sheath, with a blunt keel, covers the jaws; barbels two on each side, subequal, as long as or a little shorter than diameter of eye. Dorsal IV 9, last simple ray very strong, bony, not serrated, nearly straight, as long as head or only $\frac{2}{3}$ its length; free edge of the fin strongly emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{4}$ to $\frac{4}{5}$ length of head, reaching or nearly reaching root of caudal. Pectoral as long as or a little shorter than head, not reaching ventral; latter a little posterior to origin of dorsal. Caudal peduncle $1\frac{2}{3}$ to $1\frac{3}{4}$ as long as deep. Scales $33\,\frac{5\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 or 14 round caudal peduncle. Silvery, darker on the back; pectoral and ventral fins flesh-coloured; iris nearly white, with a fine yellow ring round the pupil.

Total length 220 millim.

Three specimens of nearly the same size, one from the Gota River at Marmusa, Jan. 21, 1902, and two from the Kassam River at Awhorra Mullka in Shoa, altitude about 4000 feet, Feb. 7, 1902.

Like the recently described *B. perplexicans* from the Tana system, this fish might be referred to the genus *Capoëta* as defined by Günther; but this, it seems to me, would be in violation of the natural affinities, which are with *B. intermedius*, Rüpp., just as those of *B. perplexicans*, Blgr., are with *B. tanensis*, Gthr., and *B. Hindii*, Blgr. Nevertheless, *Barbus plagiostomus* evidently constitutes a connecting-link between *B. intermedius* and *Varicorhinus beso* of Rüppell.

### *Barbus platystomus.*

Depth of body $3\frac{1}{2}$ to $3\frac{4}{5}$ times in total length, length of head 4 to $4\frac{1}{4}$ times. Snout very broad, rounded, not quite $\frac{1}{3}$ length of head; diameter of eye 5 to $5\frac{1}{2}$ times in length of head, interorbital width $2\frac{3}{4}$ to 3 times; mouth large, terminal, its width 3 times in length of head; lips moderately developed, interrupted on the chin; barbels two on each side, anterior as long as the eye, posterior $1\frac{1}{4}$ to $1\frac{2}{5}$ diameters of eye, the space between them as long as the eye. Dorsal IV 8–9, last simple ray very strong, bony, not serrated, feebly curved, $\frac{3}{5}$ to $\frac{6}{7}$ length of head; free edge of the fin emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{4}$ to $\frac{4}{5}$ length of head, reaching or nearly reaching root of caudal. Pectoral $\frac{5}{6}$ to $\frac{7}{8}$ length of head, not reaching ventral; latter a little posterior to origin of dorsal. Caudal peduncle $1\frac{3}{4}$ as long as deep. Scales 35–37 $\frac{5\frac{1}{2}}{4\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Bluish or steel-blue above; fins of a dark slate-colour; iris yellow or orange.

Two specimens, measuring 245 and 310 millim. respectively, from Bahardar, Lake Tsana, altitude about 5500 feet, June 4, 1902.

Intermediate between *B. Harringtoni* and *B. gorguari*, Rüpp. Distinguished from the latter by the much broader snout and the broader interorbital region. The lower pharyngeal bones are relatively small, as in *B. Harringtoni*, from which they do not differ in the dentition.

### *Barbus kassamensis.*

Depth of body $3\frac{1}{2}$ times in total length, length of head 4 times. Snout rounded, $3\frac{1}{3}$ times in length of head ; diameter of eye $4\frac{1}{2}$ times in length of head, interorbital width 3 times; mouth inferior, its width $\frac{1}{4}$ length of head; lips moderately developed, lower continuous across the chin but not produced into a lobe ; barbels two on each side, anterior $1\frac{1}{2}$ diameters of eye, posterior $1\frac{3}{5}$, the distance between them $\frac{3}{5}$ diameter of eye. Dorsal IV 8, last simple ray very strong, bony, not serrated, as long as the head ; free edge of the fin emarginate ; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray a little shorter than head and reaching root of caudal. Pectoral as long as head, nearly reaching ventral ; latter below anterior rays of dorsal. Caudal peduncle $1\frac{1}{3}$ as long as deep. Scales $30\ \frac{5\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Olive-brown above (in spirit), the scales edged with darker, yellowish beneath ; fins greenish yellow.

Total length 225 millim.

A single specimen from the Kassam River at Awhorra Mullka, Shoa, altitude about 4000 feet.

Very closely allied to *B. bynni*, Forsk. Distinguished by a less prominent snout, less developed lips, longer barbels, and a less deep body.

### *Barbus brevibarbis.*

Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$ times. Snout rounded, 3 times in length of head ; diameter of eye 4 (young) to $6\frac{1}{2}$ times in length of head, interorbital width $3\frac{1}{4}$ to $3\frac{3}{4}$ times ; mouth inferior, its width $4\frac{1}{2}$ times in length of head ; lips much developed, the lower forming a short rounded lobe in the middle ; barbels two on each side, the anterior $\frac{2}{3}$ to $\frac{3}{4}$ diameter of eye, the posterior as long as eye and as long as or a little longer than its distance from the anterior. Dorsal IV 9, last simple ray very strong, bony, not serrated, straight or very slightly curved, $\frac{2}{5}$ to $\frac{3}{4}$ length of head ; free edge of the fin emarginate ; its distance from the occiput equal to or a little less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{5}$ length of head. Pectoral about $\frac{2}{3}$ length of head, not reaching ventral; latter below or slightly posterior to origin of dorsal. Caudal peduncle $1\frac{2}{3}$ as long as deep. Scales 31–33 $\frac{5\frac{1}{2}}{4\frac{1}{2}}$, $2\frac{1}{2}$ or 3 between lateral line and ventral, 12 round caudal peduncle. Bluish olive above, yellowish beneath; fins dark slate-colour; iris deep yellow.

Four specimens, measuring 350, 250, 150, and 130 millim. respectively, were obtained in Lake Tsana, the largest at Zegi, May 31, 1902, the three others at Bahardar, June 4, 1902.

This species is near *B. nedgia*, Rüpp., from which it is distinguished by the lesser development of the lips and the shorter barbels.

### *Barbus leptosoma.*

Depth of body $3\frac{3}{4}$ to $4\frac{1}{2}$ times in total length, length of head 4 to $4\frac{1}{4}$ times. Snout rounded, $3\frac{1}{5}$ to $3\frac{1}{2}$ times in length of head; diameter of eye 4 to $4\frac{2}{3}$ times in length of head, interorbital width $3\frac{1}{5}$ to $3\frac{1}{3}$ times; mouth inferior, its width $4\frac{1}{2}$ to 5 times in length of head; lips moderately developed, continuous across the chin; barbels two on each side, subequal, as long as the eye or a little shorter, longer than the distance between them. Dorsal III 8–9, last simple ray very strong, bony, not serrated, straight or slightly curved, as long as or slightly shorter than the head; free edge of the fin emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ length of head. Pectoral $\frac{4}{5}$ to $\frac{7}{8}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle twice or nearly twice as long as deep. Scales 30–35 $\frac{5\frac{1}{2}-6\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Silvery in life, tinged with a vivid blue; the belly and fins whitish, tinged with carneous.

Three specimens, two measuring 225 millim., the third 160, from Zegi, Lake Tsana, May 18 and 19, 1902.

Distinguished from *B. brevibarbis* by the more elongate form, the shorter head, the thinner lips, and the longer spine of the dorsal fin.

### *Barbus oreas.*

Depth of body equal to length of head, 4 times in total length. Snout rounded, 3 times in length of head; diameter of eye $4\frac{1}{2}$ to 5 times in length of head, interorbital width 3 times; mouth inferior, its width 4 times in length of head; lips much developed, the lower forming a short rounded median lobe; barbels two on each side, anterior slightly longer than eye, posterior $1\frac{1}{4}$ to $1\frac{1}{3}$ as long as eye, the distance between them $\frac{2}{3}$ diameter of eye. Dorsal IV 9, last simple ray strong, bony, not serrated, straight, $\frac{3}{5}$ or $\frac{2}{3}$ length of head; free edge of the fin emarginate; its distance from the occiput less than its distance from the caudal. Anal III 5, longest ray $\frac{2}{3}$ length of head. Pectoral $\frac{3}{4}$ or $\frac{4}{5}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{3}{4}$ or twice as long as deep. Scales $33\,\frac{5\frac{1}{2}}{4\frac{1}{2}\text{–}5\frac{1}{2}}$, $2\frac{1}{2}$ between lateral line and ventral, 12 or 14 round caudal peduncle. Olive above, silvery on the sides and below; dorsal and caudal fins greyish.

Total length 170 millim.

Two specimens from the Jerrer, near Harrar (ca. 6000 feet), Jan. 13, 1902.

Very nearly related to *B. gananensis*, Vincig., from the Ganana and Auata Rivers, Somaliland; distinguished by the smaller eye, the narrower interorbital space, the shorter spine of the dorsal, and the longer caudal peduncle.

### *Barbus Duchesnii.*

Depth of body $3\frac{1}{3}$ to $3\frac{1}{2}$ times in total length, length of head 4 to $4\frac{1}{4}$ times. Snout rounded, 3 to $3\frac{1}{3}$ times in length of head, interorbital width 3 times; mouth inferior, its width 4 times in length of head; lips moderately developed, the lower continuous; barbels two on each side, subequal, $1\frac{3}{5}$ to $1\frac{3}{4}$ diameters of eye. Dorsal IV 9, last simple ray very strong, bony, not serrated, straight or very slightly curved, $\frac{3}{4}$ to $\frac{4}{5}$ length of head; free edge of the fin strongly emarginate; its distance from the occiput a little less than its distance from the caudal. Anal III 5, longest ray $\frac{5}{6}$ length of head, reaching or nearly reaching root of caudal. Pectoral nearly as long as head, narrowly separated from ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{1}{2}$ as long as deep. Scales 30–33 $\frac{5\frac{1}{2}}{4\frac{1}{2}}$, $2\frac{1}{2}$ between lateral line and ventral, 12 round caudal peduncle. Colour iridescent green and blue in life; all the fins dark slate-colour; iris dark, with a fine yellow circle round the pupil.

Total length 300 millim.

Two specimens: the larger from Bahardar, Lake Tsana, June 2, 1902; the other (250 millim. long) from the Moger River, a tributary of the Blue Nile, in Shoa, altitude about 4000 feet, April 17, 1902.

Named after M. J. Duchesne-Fournet, the chief of the French Scientific Mission of that name, who most kindly assisted Mr. Degen with advice during his stay on Lake Tsana.

*B. Duchesnii* is related to *B. affinis*, Rüpp., but differs chiefly in the longer barbels and the broader interorbital region.

### *Barbus mento.*

Depth of body equal to length of head, $3\frac{3}{4}$ times in total length. Snout rounded, 3 times in length of head; diameter of eye 6 times in length of head, interorbital width 3 times; mouth inferior, its width 4 times in length of head; lips very strongly developed, the lower produced into a subtriangular median lobe which is as long as the eye; anterior barbel $1\frac{1}{2}$, posterior $1\frac{2}{3}$ diameters of eye, the space between them a little greater than diameter of eye. Dorsal IV 8, last simple ray very strong, bony, not serrated, slightly curved, $\frac{1}{2}$ length of head; free edge of the fin emarginate; its distance from the occiput a little less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{4}$ length of head, reaching root of caudal. Pectoral $\frac{3}{4}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{2}{3}$ as long as deep. Scales 35 $\frac{5\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 round caudal peduncle. Olive above, yellowish beneath; fins greyish.

Total length 300 millim.

A single specimen obtained at Marmasa (alt. nearly 5000 feet) in the Gota River, flowing northwards from the Jebel-Amhar Mountains, Jan. 21, 1902.

*Barbus mento* may be compared with *B. nedgia*, Rüpp., from which it differs in the broader head, the broader interorbital region, and the lesser development of the lips. It differs from *B. Duchesnii* in the less elevated body and the longer mental lobe.

### *Barbus hursensis.*

Depth of body equal to length of head, $3\frac{3}{4}$ or 4 times in total length. Snout obtusely conical, 3 times in length of head; diameter of eye 5 times in length of head, interorbital width $3\frac{1}{4}$ times; mouth inferior, its width 4 times in length of head; lips strongly developed, the lower forming a rounded median lobe; anterior barbel $1\frac{1}{2}$, posterior twice as long as eye, the distance between them a little less than diameter of eye. Dorsal III 8–9, last simple ray strong, bony, not serrated, curved, $\frac{3}{5}$ or $\frac{2}{3}$ length of head; free edge of the fin emarginate; its distance from the occiput a little less than its distance from the caudal. Anal II 5, longest ray $\frac{2}{3}$ length of head, reaching root of caudal. Pectoral $\frac{4}{5}$ or $\frac{5}{6}$ length of head, not reaching ventral; latter somewhat posterior to origin of dorsal. Caudal peduncle $1\frac{1}{3}$ or $1\frac{1}{2}$ as long as deep. Scales $32\text{–}34\ \frac{5\frac{1}{2}-6\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 12 or 14 round caudal peduncle. Olive above, golden on the sides; fins yellowish green; iris golden yellow.

Total length 210 millim.

Two specimens from the Hurso River, Upper Adal country, altitude about 7000 feet, Jan. 17, 1902. A third badly preserved specimen from the Gota River probably belongs to the same species.

The longer barbels and the broader interorbital space distinguish this species from Rüppell's *B. affinis*, to which it is most nearly related.

## *Barbus Degeni.*

Depth of body $3\frac{2}{3}$ to $4\frac{1}{3}$ times in total length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ times. Snout pointed, $2\frac{2}{3}$ to 3 times in length of head; diameter of eye 5 to $8\frac{1}{2}$ times in length of head, interorbital width $3\frac{1}{2}$ times; snout produced into a triangular dermal flap overhanging the lip; mouth inferior, its width $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head; lips very strongly developed, the lower produced into a rounded median lobe which measures $\frac{1}{2}$ to $\frac{2}{3}$ the diameter of the eye; anterior barbel 1 to $1\frac{1}{3}$, posterior $1\frac{1}{5}$ to $1\frac{1}{2}$ diameters of eye, the space between them equal to or a little less than diameter of eye. Dorsal IV 9, last simple ray very strong, bony, not serrated, straight or slightly curved, $\frac{1}{3}$ to $\frac{2}{3}$ length of head; free edge of the fin emarginate; its distance from the occiput a little less than its distance from the caudal. Anal III 5, longest ray $\frac{1}{2}$ to $\frac{2}{3}$ length of head, reaching or nearly reaching root of caudal. Pectoral $\frac{3}{5}$ to $\frac{3}{4}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as deep. Scales $31\text{–}35\ \frac{5\frac{1}{2}-6\frac{1}{2}}{4\frac{1}{2}-5\frac{1}{2}}$, $2\frac{1}{2}$ or 3 between lateral line and ventral, 12 round caudal peduncle. Head and upper part of body dark slate-colour, sides dark green, belly yellowish green in life; caudal green, other fins steel-grey; iris dark bronzy.

Four specimens, measuring 225 to 450 millim., from Lake Tsana. The largest was obtained at Zegi, May 27, 1902, the others at Bahardar, June 1 and 4, 1902.

This fine *Barbus* is closely allied to *B. nedgia,* differing in the less developed mental lobe and the absence of an upper labial lobe, which is replaced by a similar appendage formed by the skin of the snout above the lip.

### *Barbus pleurogramma.*

Depth of body equal to length of head, 4 times in total length. Snout rounded, $4\frac{1}{2}$ times in length of head; diameter of eye 3 to $3\frac{1}{2}$ times in length of head, interorbital width 3 times; mouth terminal, its width $4\frac{1}{2}$ times in length of head; lips feebly developed; barbels two on each side, the anterior barely $\frac{1}{2}$ diameter of eye and longer than its distance from the posterior, which measures nearly $\frac{3}{4}$ diameter of eye. Dorsal III 7, last simple ray bony, strongly serrated behind, $\frac{3}{4}$ length of head; free edge of the fin not emarginate; its distance from the occiput a little less than its distance from the caudal. Anal III 5, longest ray $\frac{3}{5}$ length of head. Pectoral $\frac{2}{3}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle twice as long as deep. Scales 35 $\frac{6\frac{1}{2}}{5\frac{1}{2}}$, 3 between lateral line and ventral, 16 round caudal peduncle. Silvery, brownish on the back; a black line along each side of the body; fins greyish.

Total length 40 millim.

Three specimens from Bahardar, Lake Tsana, June 4, 1902, and one from the Unfras River, Lake Tsana, May 9, 1902.

Near the East African *B. paludinosus*, Peters, in which, however, the dorsal fin originates behind the vertical of the base of the ventrals.

### *Barbus humilis.*

Depth of body $3\frac{1}{3}$ to $3\frac{3}{4}$ times in total length, length of head $3\frac{2}{3}$ to 4 times. Snout rounded, 4 times in length of head; diameter of eye 3 to $3\frac{1}{2}$ times in length of head, interorbital width $2\frac{1}{2}$ to $2\frac{2}{3}$ times; mouth terminal, its width 4 times in length of head; lips feebly developed; barbels two on each side, the anterior about $\frac{1}{2}$, the posterior $\frac{2}{3}$ diameter of eye, the space between them hardly $\frac{1}{2}$ diameter of eye. Dorsal III 8, last simple ray not enlarged, flexible, as long as head; free edge of the fin emarginate; its distance from the occiput about $\frac{2}{3}$ its distance from the caudal. Anal III 5, longest ray $\frac{3}{5}$ length of head. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle twice as long as deep. Scales 29–31 $\frac{4\frac{1}{2}}{4\frac{1}{2}}$, 2 between lateral line and ventral, 12 or 14 round caudal peduncle. Silvery, brownish on the back; an indistinct darker lateral band; fins whitish.

Total length 65 millim.

Numerous specimens from Bahardar, Lake Tsana, June 4, 1902.

The nearest ally of this small Barbel appears to be *B. inermis*, Peters, the dorsal of which originates in front of the vertical of the base of the ventrals.

### *Barbus trispilopleura.*

Depth of body equal to length of head, $3\frac{1}{2}$ times in total length. Snout rounded, 4 times in length of head; diameter of eye 3 times in length of head, interorbital width $2\frac{1}{2}$ times; mouth terminal, its width $4\frac{1}{2}$ times in length of head; lips feebly developed; barbels two on each side, the anterior $\frac{2}{3}$, the posterior a little longer than diameter of eye. Dorsal III 7–8, last simple ray not enlarged, flexible, as long as head; free edge of the fin not emarginate; its distance from the occiput about $\frac{2}{3}$ its distance from the caudal. Anal III 5, longest ray $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{2}{3}$ length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle $1\frac{2}{3}$ as long as deep. Scales 27–28 $\frac{4\frac{1}{2}}{4\frac{1}{2}}$, 2 between lateral line and ventral, 12 round caudal peduncle. Brownish above, silvery on the sides and below; three round black spots on each side of the body, the first and second above the lateral line, the third on the lateral line at the base of the caudal.

Total length 45 millim.

Three specimens from Bahardar, Lake Tsana, June 4, 1902.

Resembles *B. trimaculatus*, Peters, in general appearance, but the scales are fewer, the last unbranched dorsal ray is weaker, and the barbels are shorter.

### *Nemachilus abyssinicus.*

Depth of body 7 times in total length, length of head 5 times. Head feebly compressed behind, twice as long as broad. Snout a little shorter than postorbital part of head, a little depressed; eye $6\frac{1}{2}$ times in length of head, $\frac{3}{5}$ interorbital width; longest barbels twice diameter of eye. Dorsal 10, a little nearer caudal than occiput, originating immediately behind vertical of root of ventral, middle rays longest, nearly $\frac{3}{4}$ length of head. Anal 9. Caudal slightly emarginate. Caudal peduncle $1\frac{1}{2}$ as long as deep. Yellowish brown, with irregular dark spots, and a series of 10 large transverse dark spots along the back; a small round black spot on the dorsal; caudal with dark spots.

Total length 40 millim.

A single specimen from Bahardar, Lake Tsana, June 4, 1902.

This is the first known African representative of the Cobitidinæ. It belongs to a genus of wide distribution in Europe and Asia, and its nearest ally appears to be N. *Leontinæ*, Lortet, from the Lake of Galilee.

### *Clarias tsanensis.*

Depth of body $6\frac{1}{2}$ to $7\frac{1}{2}$ times in total length, length of head $3\frac{1}{5}$ to $3\frac{4}{5}$ times. Head $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as broad, perfectly smooth above; vertex very strongly flattened, almost concave in the adult; occipital process angular; frontal fontanelle knife-shaped, 3 to 4 times as long as broad, 4 to 5 times in length of head; occipital fontanelle indistinct; eye small, $2\frac{1}{2}$ (young) to 4 times in length of snout, 4 (young) to 6 times in interorbital width; width of mouth equal to interorbital width, $\frac{1}{2}$ length of head. Band of præmaxillary teeth 4 to $5\frac{1}{2}$ times as long as broad; vomerine teeth granular, forming a crescentic band, which is as broad as the præmaxillary band. Nasal barbel $\frac{1}{3}$ to $\frac{1}{2}$ length of head ($\frac{3}{4}$ in the very young); maxillary barbel $\frac{3}{4}$ to 1 length of head (longer in the very young), reaching base or extremity of pectoral spine; outer mandibular barbels $\frac{1}{2}$ to $\frac{4}{5}$ length of head (as long as head in the very young). Gill-rakers fine and closely set, 60 to 70 on first arch (45 in young). Dorsal 78–85, its distance from the occipital process $\frac{1}{5}$ to $\frac{1}{4}$ length of head, its distance from the caudal hardly equal to the diameter of the eye. Anal 60–70, touching root of caudal. Pectoral not quite $\frac{1}{2}$ length of head, the spine very slightly serrated on the outer border, $\frac{3}{5}$ (young) to $\frac{2}{3}$ the length of the fin. Ventral equally distant from end of snout and from caudal, or a little nearer the former. Caudal nearly $\frac{1}{2}$ length of head. Dark olive-brown above, greyish beneath.

Five specimens, measuring 125 to 430 millim., from Zegi, Lake Tsana, May 12 and 22, 1902.

The smooth head, combined with the high number of gill-rakers and of dorsal rays, and the absence of a space between the anal and caudal fins, distinguish this species from its allies with granular vomerine teeth.

### *Clarias Vinciguerræ.*

Depth of body 7 times in total length, length of head 3 times. Head $1\frac{5}{7}$ as long as broad, its upper surface strongly granulated; occipital process angular; frontal fontanelle knife-shaped, $3\frac{1}{2}$ times as long as broad, $4\frac{1}{2}$ times in length of head; occipital fontanelle small, in advance of occipital process; eye small, 3 times in length of snout, $5\frac{1}{2}$ times in interorbital width; width of mouth a little less than interorbital width, $\frac{2}{5}$ length of head. Band of præmaxillary teeth $5\frac{1}{2}$ times as long as broad; vomerine teeth granular, forming a crescentic band which is as broad as the præmaxillary band. Nasal barbel $\frac{2}{5}$ length of head; maxillary barbel slightly shorter than head, reaching base of pectoral fin; outer mandibular barbel $\frac{2}{3}$ length of head, inner $\frac{2}{5}$. Gill-rakers fine and closely set, about 90 on first arch. Dorsal 67, its distance from the occipital process $\frac{1}{8}$ length of head, its distance from the caudal 2 diameters of eye. Anal 53, narrowly separated from the caudal. Pectoral not quite $\frac{1}{2}$ length of head, the spine finely serrated on the outer border, $\frac{5}{7}$ the length of the fin. Ventral a little nearer end of snout than caudal. Latter nearly $\frac{1}{2}$ length of head. Dark brown above, whitish beneath; anal and caudal with a fine light edge.

Total length 410 millim.

A single specimen from the Kassam River at Awhorra Mullka, Shoa, about 4000 feet, Feb. 7, 1902.

This species, named after Dr. D. Vinciguerra, is closely related to *C. Robecchii*, Vincig., from which it is distinguished, as well as from *C. lazera* and other species with granular vomerine teeth, by the narrower head and by the shorter interspace between the occiput and the origin of the dorsal fin; the gill-rakers are more numerous than in *C. Robecchii*, resembling those of *C. lazera*, in which the vomerine teeth form a wider band.

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## LX.—*On new Species of South-African* Curculionidæ *of the Genus* Hipporrhinus, *Schön.* By Guy A. K. Marshall, F.Z.S.

[Concluded from p. 417.]

### *Hipporrhinus janus*, sp. n.

Long. (excl. apical spine) 19, lat. $8\frac{1}{2}$ millim. Length of apical spines 1 millim.

*Head* convex, with scattered shallow punctures on vertex, much deeper and coarser on forehead, which is retuse and has a short central carina; anteocular furrows deep and complete. *Rostrum* cut off from head by a deep dorsal incision, as long as prothorax only, deflected and scarcely curved, subparallel for two-thirds of its length, thence dilated to apex. Upper surface convex, with five narrow and undulating carinæ, the central being higher and also rather shorter than the others; the lateral sulci broad and deep, the lower pair longer, the upper pair meeting at base; scrobes not purely lateral, but continued to beneath base of rostrum; inferior basal sulcus deep. *Antennæ* piceous, finely squamose; scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* a little broader than long, the length greater than the width at base, which is broader than apex; sides moderately rounded, broadest about middle, ocular lobes strongly developed. Upper surface slightly convex, closely set with small rounded tubercles having scarcely perceptible setæ, central furrow very narrow and without a carina; tubercles bare, shiny, interstices with whitish scaling forming three ill-defined stripes. *Elytra* broadly ovate, shoulders prominent and subrectangular, sides very little dilated, broadest much before middle, apical processes long and sharp. Upper surface convex, with shallow sulci containing regular rows of granules, which are very much reduced towards apex; the intervals with single rows of small tubercles, which are depressed and rather elongate in the dorsal area, but elevated towards the sides and apex; the tubercles shiny and mostly without setæ, the interstices with scattered patches of whitish scaling, the scales being very large and circular. *Legs* with sparse scaling and pale setæ; the three basal joints of posterior tarsi subequal; the onychium elongate, about equal to the three preceding joints together.

CAPE COLONY (*Colls. Pascoe & Jekel*).

A striking species superficially resembling *H. obesus*, Gyl., and *H. verrucellus*, Gyl., but readily recognized by the presence of a strong central carina on the rostrum and by the long apical spines. *H. corpulentus*, Gyl., which has the rostral carina, has a very different appearance, owing to the even granulation throughout the elytra obliterating the sulci; its apical processes also are very short and tuberculiform.

### *Hipporrhinus congestus*, sp. n.

Long. 13, lat. 7 millim.

*Head* convex, rugosely punctured, some of the punctures containing a single large white scale, forehead not flattened, coarsely strigose and with a short central stria; anteocular furrows deep and complete. *Rostrum* separated from head by a deep dorsal incision, as long as the thorax only, distinctly curved, subparallel to beyond middle, then slightly dilated. Upper surface convex, with a deep narrow central furrow throughout having a broad and coarsely punctured costa on either side; both pairs of lateral furrows are deep and distinct, being of equal length; the intervening carina is narrow and impunctate; the upper sulci alone meet at the base, which is not elevated; the scrobes are quite lateral, and almost parallel to the sulci; the inferior basal furrow is strongly developed. *Antennæ* black, setose; scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* nearly as long as broad, the length equal to the width at base, apex much narrower, sides very little rounded, slightly diverging from base to near apex, then rapidly narrowing, broadest well before middle. Upper surface convex, closely set with large rounded shiny granules, leaving a very narrow central stria without any carina; granules without setæ; scaling almost absent; ocular lobes strongly developed. *Elytra* short ovate, shoulders prominent and almost rectangular, sides strongly rounded, broadest about middle, apical processes short and blunt in female. Upper surface convex, with no distinct striation, the whole surface being equally covered with even and regular rows of rounded granules, except for a tubercular prominence on the declivity of the third interval (as in *albicinctus*, Gyl.) and a much lower elongate one on the declivity of interval 5; a few isolated white scales are scattered about the surface, but they are more numerous near the margins. *Legs* black, with scattered white scales and black setæ; the tubercles on the inner edges of tibiæ large and tooth-like; posterior tarsi setose, the three basal joints subequal.

SOUTH AFRICA (*Sir A. Smith*).

A very distinct species allied to *corpulentus*, Gyl., from which it may be distinguished at once by the presence of the tubercular prominences on the declivity and the absence of a central carina on the rostrum. On account of these prominences it also bears some resemblance to *albicinctus*, Gyl.; but the granulation is much finer than in that species, the shoulders are not produced forwards, and the rostrum has no central carina.

### *Hipporrhinus criniger*, sp. n.

Long. 16, lat. 6 (♂), 7 (♀) millim.

*Head* very convex; punctuation on vertex closer but shallow, deeper and more scattered in front; forehead retuse, with a more or less distinct central impression; anteocular furrows deep and complete. *Rostrum* cut off from head by a deep dorsal incision, about as long as prothorax only, stout, strongly curved, sides subparallel to beyond middle, then gently dilated to apex. Upper surface convex, with five strong carinæ, which are generally smooth and shiny; the lateral sulci deep and strong, the lower pair rather shorter, the upper pair alone meeting at base; scrobes straight, oblique but lateral; inferior basal furrow very deep. *Antennæ* with scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* distinctly transverse, the length about equal to the width at base, apex scarcely narrower, sides strongly rounded, broadest a little behind middle, ocular lobes moderately prominent; upper surface almost plane, closely set with round flattened tubercles (devoid of setæ) leaving a narrow central furrow, without a carina; tubercles bare, interstices with dense brown scaling. *Elytra* oblongo-ovate, much narrower in male, shoulders sloping, sides scarcely rounded, broadest at or before middle, apical processes absent in both sexes, the sutural part slightly raised on the declivity in female only. Upper surface slightly convex, striæ with regular rows of shallow punctures separated by small granules, alternate intervals more prominent: intervals 1, 3, 5, and 7 with elongate depressed shiny tubercles, each bearing a very long erect black seta; intervals 2, 4, and 6 with rows of small closely set granules, each bearing a very short depressed pale seta; tubercles and granules bare, interstices with dense brown scaling, more or less variegated with small white patches. *Legs* with close pale pubescence slightly thicker near apex of femora; second joint of posterior tarsi shorter than first, equal to, but narrower than, third.

Cape Colony.

I have found examples of this species in the British and Oxford Museums (under the collection name "*petrous*," Buq ); and there is a single male in the Stockholm Museum which has been labelled *H. lacunosus*, Gyl., by Mr. Péringuey. Although this insect has a strong superficial resemblance to Gyllenhal's species, an examination of his type (a female) shows it to be quite distinct. In *lacunosus* the intervals are uniform and the granules are subequal throughout, there being no elongate tubercles; moreover there are no long black setæ, but each granule has a very short pale seta, strongly depressed.

### *Hipporrhinus Gunningi*, sp. n.

Long. 19–20, lat. 7½–8 millim.

*Head* closely punctured and densely squamose, convex on vertex, forehead flattened and with a central carina; eyes rather prominent; anteocular furrows obsolescent. *Rostrum* not incised at base, scarcely as long as prothorax alone, slightly deflected and very little curved. Upper surface with a shallow central furrow throughout containing a narrow shiny carina; lateral sulci well-marked, the upper pair uniting at base, which is not much raised; costæ between sulci obtuse, densely squamose and each with a single row of shiny black granules; scrobes almost straight, lateral but oblique; inferior basal furrow absent. *Antennæ* with scape just reaching eye; the basal joints of funicle subequal. *Prothorax* as long as broad, apex and base of equal width, sides rounded, broadest about middle, a faint transverse impression just behind apex, ocular lobes feebly developed. Upper surface convex, closely set with small granular tubercles leaving a narrow central furrow, without a carina; tubercles black, shiny, each with a depressed seta, interstices with brownish-grey scaling and three narrow paler lines. Elytra elongate, strongly acuminate towards apex in female, scarcely so in male, shoulders sloping, sides rounded, broadest rather behind middle, apical processes absent. Upper surface not very convex, with regular broad shallow striæ containing single rows of small granules; intervals of equal height, with somewhat irregular and often duplicated rows of small closely-set granules; granules black and shiny, each with a depressed seta; scaling dense, fulvous, variegated with small patches of dark brown and grey. *Legs* black, with thin grey pubescence; posterior tarsi with the second joint narrower than first and third, but about as long as the latter.

TRANSVAAL: Leydenburg (teste *Dr. J. W. B. Gunning*).

Through the kindness of Dr. Gunning, I received some years ago a series of six examples of this species from the Pretoria Museum. Its only close ally is *constrictus*, Gyl., which differs, however, in having the prothorax much broader than long, and also in having the dorsal part of the rostrum much more strongly elevated above the level of the forehead. Both these insects may be distinguished from the adjoining species, *arenarius*, Fåhr., and *laticeps*, Mshl., by their large size and the presence of a frontal carina.

### *Hipporrhinus errans*, sp. n.

Long. 12, lat. 6 millim.

*Head* densely covered with brown squamæ, vertex convex, forehead flattened and with a short central stria; anteocular furrows distinct in their upper half only. *Rostrum* not incised at base, stout, about as long as prothorax only, not much curved. Upper surface almost plane, with a distinct carina abbreviated in front, rugosely punctured, with dense scaling and scattered setæ. Lateral sulci distinct, the upper pair rather longer and broader, and meeting at the base, which is a little elevated; scrobes lateral, straight and oblique; inferior basal furrow deep. *Antennæ* with scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* distinctly transverse, apex a little narrower than base, sides strongly rounded, broadest about middle, ocular lobes moderate. Upper surface convex, closely set with small granular tubercles leaving a very narrow and ill-defined central furrow, containing no carina; apices of tubercles black, shiny, each bearing a depressed seta, interstices with dense brown scaling and three narrow whitish lines. *Elytra* short ovate, sides moderately rounded, broadest about middle, shoulders rounded, apical processes very short but acute. Upper surface convex, with regular rows of deep punctures, intervening granules sometimes present, but hidden by the scaling; intervals unevenly costate: intervals 3, 5, and 7 more raised than the others and with regular and complete rows of low granules; interval 1 has a similar complete row, but 2, 4, and 6 are very variable, bearing anything from a complete row to none at all; granules shiny and each with a short depressed seta; scaling dense, variegated brown and grey. *Legs* with sparse pale scaling, which is more dense at the apex of femora; posterior tarsi with the joints of about the same width, second and third subequal, first longer.

NATAL: Estcourt.

In its general facies this insect resembles such species as *arenarius*, Fåhr., and *albicans*, Gyl., from which it may be readily recognized by the uneven elevation of the intervals on the elytra.

### *Hipporrhinus consors*, sp. n.

Long. 11, lat. $5\frac{1}{2}$ millim.

*Head* with dense brownish scaling, vertex convex, forehead plane and without carina or fovea; anteocular furrows distinct, but not very deep. *Rostrum* not incised at base, shorter than prothorax only, deflected from base, very little curved. Upper surface closely but faintly punctured, densely covered with greyish scaling, with a large tubercle close to base, which is strongly bifid and distinctly dilated at apex; the anterior part without furrows and smooth except for a very faint central carina; both pairs of lateral furrows almost obsolete; scrobes lateral, but oblique and almost straight; inferior basal furrow distinct. *Antennæ* short, thick, squamose; scape just reaching eye; the two basal joints of funicle subequal, not much longer than the others. *Prothorax* transverse, base and apex of equal width, sides strongly rounded, broadest rather before middle, a transverse impression behind apex, ocular lobes well developed. Upper surface convex, fairly closely set with small rounded tubercles, leaving a narrow central furrow without a carina; tubercles black, shiny, with apical punctures, but without setæ; interstices with thick grey scaling. *Elytra* short ovate, shoulders sloping, sides distinctly rounded, broadest about middle, apical processes absent. Upper surface convex, with shallow striæ containing very indistinct punctures separated by small granules; these disappear towards apex and are normally hidden by the scaling; intervals evenly raised with regular and complete rows of small separated granular tubercles, those on intervals 3 and 5 being often more distant. Tubercles rounded, black and shiny, each with a very short depressed seta; interstices variegated with large patches of pale scaling, the most conspicuous of which is a broad transverse patch at the summit of the declivity. *Legs* clothed with pale scaling, which is thicker about apex of femora; posterior tarsi short and broad, the three basal joints subequal.

TRANSVAAL: Leydenburg.

I have received examples of this species from Dr. W. Horn, of Berlin, and from Dr. Gunning, of Pretoria. It may be distinguished from the allied *nasutus*, Fåhr., and *monitor*, Fåhr., by the presence of regular rows of tubercles on intervals 2 and 4 of the elytra, and also by the almost obsolete central carina on the rostrum. The latter character also separates it from *corniculatus*, Fåhr., in which species the rostral tubercle is parallel-sided and not dilated as in *consors*.

### *Hipporrhinus asper*, sp. n.

Long. 11–12, lat. 4½–5 millim.

*Head* convex, vertex closely and finely punctured and with dense fulvous scaling; forehead bare, dispersely punctured and with a distinct central fovea; anteocular furrows distinct. *Rostrum* not incised at base, about as long as head and prothorax, evenly but not strongly curved throughout. Upper surface with a distinct central furrow, narrow at base and much dilated towards apex, its sides bluntly raised; no central carina; distinctly punctured, except on a narrow smooth central line, punctures bearing depressed setæ; lower lateral sulci almost obsolete, upper ones distinct, convergent, but not meeting at base; scrobes directed to beneath base of rostrum; inferior basal furrow shallow. *Antennæ* with scape not reaching eye; the two basal joints of funicle subequal. *Prothorax* broader than long, apex about as wide as base, sides very strongly dilated (owing to several large lateral tubercles), broadest before middle, ocular lobes strongly developed. Upper surface convex, with comparatively large elevated tubercles bearing depressed setæ and leaving a deep central furrow, containing a strong carina; interstices with fulvous scaling. *Elytra* ovate, shoulders roundedly prominent, sides slightly rounded, broadest about middle, apical processes short and blunt. Upper surface convex, with regular rows of foveæ separated by small granules: interval 1 with an indistinct row of granules vanishing behind middle; interval 2 with only three to five prominent tubercles on declivity; interval 3 with a row of seven or eight elevated tubercles terminating abruptly just behind middle; intervals 4 and 6 smooth; intervals 5 and 7 with regular and complete rows of elevated tubercles; scaling sparse, variegated brown and fulvous. *Legs* with scattered scales and a denser pale ring near apex of femora; posterior tarsi with the joints of about the same width, second and third subequal, first longer.

TRANSVAAL: Leydenburg. NATAL.

I have received a single specimen of this species from Dr. Gunning, and there are six others in the British Museum. It is most nearly allied to *caudatus*, Fåhr., but, in addition to its much smaller size, it lacks the long apical processes and has the anteocular furrows converging and distinctly visible from above, whereas they are invisible in *caudatus*.

### *Hipporrhinus serratus*, sp. n.

Long. 11, lat. 5 millim.

*Head* convex, with dense fulvous scaling on vertex; forehead bare, faintly punctured, and with a rounded central depression; anteocular furrows very deep. *Rostrum* not incised at base, about as long as head and prothorax, stout and slightly curved. Upper surface convex in basal half, almost plane anteriorly, without any central furrow or carina; punctuation deep and setigerous, leaving a narrow smooth central line; lower lateral sulci faint, the upper ones much longer and deeper, meeting at base; scrobes directed to beneath base of rostrum; inferior basal furrow deep. *Antennæ* with scape not quite reaching eye; joints 1 and 2 of funicle subequal. *Prothorax* about as long as broad, base and apex of equal width, sides strongly rounded, broadest rather before middle, ocular lobes well developed. Upper surface convex, with comparatively large, separated, subconical tubercles, leaving a broad central furrow containing a well-developed carina; tubercles bare, shiny, each with a short depressed seta, interstices with fulvous scaling, paler laterally. *Elytra* oblongo-ovate, shoulders roundly prominent, apical processes in female very short and blunt, sides very slightly rounded, broadest just behind shoulders. Upper surface convex, with regular rows of foveæ, occasionally interrupted by faint granules: interval 1 without distinct granules; interval 2 with only a short apical row of four or five sharply conical tubercles; interval 3 with a basal row of rather smaller subconical tubercles terminating about middle; intervals 4 and 6 plane; intervals 5 and 7 with complete rows of sharp conical tubercles; the tubercles, which are of nearly equal size throughout, are bare and shiny, each with a depressed apical seta, the interstices with dark brown scaling variegated with lighter patches. *Legs* with dark scaling and setæ, except for a ring of white scales near apex of femora; posterior tarsi setose, the joints of about the same width, second and third subequal, first rather longer.

TRANSVAAL: Leydenburg.

The only examples I have seen of this species were kindly sent me by Dr. Gunning. It is closely related to *deplorabundus*, Fåhr., but that insect has a continuous central furrow on the rostrum, narrow at the base and broadly excavate in front; the central thoracic carina is also much fainter and concealed beneath the scaling; finally, the row of tubercles on the third interval of the elytra is evenly continuous to the apex.

### *Hipporrhinus deceptor*, sp. n.

Long. 3–15, lat. 6–7 millim.

*Head* convex, with sparse punctures and squamæ, forehead with a rounded impression, anteocular furrows distinct. *Rostrum* separated from head by a deep dorsal incision, as long as head and prothorax, thick and strongly curved. Upper surface with five strong, smooth, narrow carinæ of even height; lateral sulci deep and distinct, of about equal length, and uniting at base; scrobes lateral, straight and oblique; inferior basal furrow very deep. *Antennæ* piceous, thinly pubescent; scape barely reaching eye; the two basal joints of funicle subequal. *Prothorax* transverse (more distinctly so in female), the length equal to the width at base in female, greater in male, apex rather narrower than base, sides strongly rounded, broadest about the middle, ocular lobes not very prominent. Upper surface rather convex, closely set with small, elevated, granular tubercles, leaving a narrow central furrow without a carina; tubercles bare, shiny, and with very short depressed setæ, interstices with dark scaling and three narrow pale lines. *Elytra* ovate, much narrower in male, shoulders roundly prominent, sides strongly rounded (less so in male), broadest about middle, apical processes very small and contiguous in both sexes. Upper surface convex, distinctly sulcate, sulci with rows of shallow punctures separated by small granules; intervals all evenly raised, subcostate and with regular rows of large shiny granules, each bearing a depressed seta; scaling uneven, with small variegated patches of brown, fulvous, or white. *Legs* piceous, with fine pale pubescence; posterior tarsi with the second joint a trifle narrower than the others, second and third subequal, first longer.

CAPE COLONY: Port Elizabeth (*Dr. H. Brauns*).

Dr. Brauns has kindly sent me a fine series of this new species, apart from which I have seen only a single example, a female, in Chrevolat's collection at Stockholm. It is allied to *lacunosus*, Gyl., which differs in having a much thicker and more strongly curved rostrum, the dorsal surface of which is almost plane and has only a low carina (whereas in *deceptor* it is very deeply sulcate with a strong central carina); again, the first joint of the funicle is distinctly longer than the second (an unusual character in the genus); the prothorax is more narrowed behind and the tubercles are strongly depressed; the elytra of the female *lacunosus* (I have not seen the male) are much more oblong, the suture is prominently raised on the declivity, the sulci are shallower, the granules more depressed and elongate, and the apical processes absent.

### *Hipporrhinus sparsus*, sp. n.

Long. 12, lat. 6 millim. (female).

*Head* convex, bare, with faint scattered punctures; forehead with a slight central depression; anteocular furrows deep and complete. *Rostrum* cut off from head by a deep dorsal incision, as long as head and prothorax, distinctly curved, very gradually dilated from base to apex. Upper surface nearly plane, with three fine carinæ, the central one the shortest and vanishing beyond middle; no scaling, punctuation indefinite; lateral sulci broad and deep, separated by a strong costa bearing a faint stria, the upper pair only meeting at base; scrobes straight and lateral, almost parallel to the sulci; inferior basal furrow very deep. *Antennæ* piceous; scape just reaching eye; the two basal joints of funicle subequal. *Prothorax* slightly transverse, the length greater than the width at base, which is equal to the apex, sides strongly rounded, broadest about middle, ocular lobes moderately developed. Upper surface slightly convex, closely set with small elevated shiny tubercles with short depressed apical setæ, central furrow very narrow and without carina; interstices with sparse brown scaling. *Elytra* oblongo-ovate, shoulders prominent, the breadth there much greater than base of thorax, sides not much rounded, broadest before middle, apical processes absent in female. Upper surface slightly convex, with shallow closely punctured striæ; intervals with small rather distant tubercles, which are somewhat depressed dorsally and near base, but conical towards sides and apex; intervals 2, 4, and 6 with the tubercles more distant than the rest; interval 1 slight, raised (female) on declivity and with the tubercles there closely set; tubercles with a short apical seta, elytra bare except for a few small scattered patches of yellowish scales. *Legs* black with fine pale scaling; second and third joints of posterior tarsi subequal.

Cape Colony (*Coll. Pascoe*).

A fairly distinct species, coming nearest to *H. deceptor*, Mshl., from which it may be distinguished by the absence of the central furrow on the rostrum and the fine narrow central carina; also by the larger and more distant tubercles on the elytra and the smallness of the prothorax.

### *Hipporrhinus chirindensis*, sp. n.

Long 17, lat. 8 millim.

*Head* convex, with indistinct punctures and fairly dense brown squamæ; forehead with a distinct central stria; anteocular furrows very deep and strong, approaching one another closely above. *Rostrum* not incised at base, about as long as head and thorax, distinctly curved. Upper surface with a shallow central furrow triangularly dilated to apex and containing a faint central carina; lateral sulci deep, the upper pair convergent at base but not meeting; the interval between the sulci carinate and rugosely punctured; scrobes directed to beneath base of rostrum; inferior basal furrow shallow. *Antennæ* with scape not reaching eye; the two basal joints of funicle subequal. *Prothorax* broader than long, narrower at apex than at base, sides strongly dilated, broadest about middle, ocular lobes moderate. Upper surface almost plane, with a broad transverse impression just behind apex, fairly closely set with small shiny rounded tubercles, each bearing a short depressed seta; central furrow shallow, containing a very short but well-marked carina; interstices with uniform brown scaling. *Elytra* ovate, shoulders sloping, sides moderately rounded, broadest about middle; apical processes in female very short, blunt, and divergent. Upper surface convex, with regular rows of foveæ separated by small shiny granules: interval 1 with a few indistinct granules; 2, 3, 5, and 7 subcostate and with regular rows of granules; on the last three the rows are complete and the granules are larger on the declivity; on interval 2 the granules cease abruptly at the summit of declivity; scaling uniform earth-brown. *Legs* with sparse depressed pale setæ on femora and an ill-defined ring of light scales near apex; tibiæ with mingled light and dark setæ, the former depressed, the latter erect; posterior tarsi spongy beneath, joints of about the same width, second and third subequal, first longer.

MASHONALAND: Mt. Chirinda, Melsetter District.

Very nearly allied to *H. Bohemanii*, Fåhr., but smaller, and distinguished by the absence of granules on intervals 4 and 6 of the elytra, the presence of a central furrow and carina on the rostrum, and the long stria on the forehead.

### *Hipporrhinus brevis*, sp. n.

Long. 10, lat. 5 millim. (female).

*Head* convex on vertex, which is closely and distinctly punctured; forehead flattened, with fine convergent plications and a short low central carina near the rostrum bearing a single fovea; anteocular furrows obsolete. *Rostrum* not incised at base, short and thick, as long as thorax only, deflected and slightly curved. Upper surface with a stout basal tubercle which has its sides rather convergent and its apex sharply bifurcated; anterior part almost plane, rugosely punctured and with a very faint short carina; lateral sulci broad and distinct, uniting at base; scrobes lateral and curved; inferior basal furrow very deep. *Antennæ* with scape reaching to about middle of eye; the two basal joints of funicle subequal. *Prothorax* transverse, the length equal to the width at base, which is as broad as apex, ocular lobes distinct. Upper surface convex, closely set with low granules, each bearing a pale depressed seta; scaling brown, with three narrow and indistinct paler lines. *Elytra* very short, ovate, sides strongly rounded, broadest before middle, acuminate behind (female), shoulders rounded, apical processes absent. Upper surface rather convex, striæ with rows of shallow, subreticulate foveæ, intervals evenly raised and with large, very depressed, shiny, distant granules, which bear depressed pale setæ; scaling not very dense, yellowish brown. *Legs* with scattered pale scaling, forming a denser ring at apex of femora; posterior tarsi with the three basal joints of about the same width, second and third subequal, first longer.

Cape Colony.

The nearly allied *talpa*, Fåhr., and *vicinus*, Mshl., differ in the absence of plication on the forehead, in the finer punctuation of the striæ, and in the smaller and much more numerous granules (and therefore setæ) on the elytra.

### *Hipporrhinus Braunsi*, sp. n.

Long. 11, lat. 5 millim.

*Head* convex on vertex, forehead flattened and with a deep impression on each side; punctuation close and regular, but mostly hidden by fulvous scaling; anteocular furrows deep, convergent above and only separated by a narrow costa. *Rostrum* not incised at base, nearly as long as head and prothorax, deflected and slightly curved. Upper surface with a broad and distinct central furrow throughout, containing no carina, but with its edges carinate and bearing a regular row of depressed pale setæ; punctuation hidden by uniform dense brown scaling; lateral sulci broad and deep, subequal, the upper pair alone meeting at base, which is much raised above the level of forehead; scrobes directed to beneath base of rostrum; inferior basal furrow deep. *Antennæ* with scape not reaching eye; joints 1 and 2 of funicle subequal. *Prothorax* a trifle broader than long, apex and base of equal width, sides strongly rounded, broadest before middle, ocular lobes well developed. Upper surface convex, with small rounded widely separated tubercles leaving a broad but shallow central furrow containing a distinct carina; tubercles black and shiny, with a depressed pale apical seta; interstices with dense brown squamosity. *Elytra* ovate, shoulders rounded, sides very little dilated, broadest before middle, apical processes (in female only) very small, tuberculiform, and contiguous. Upper surface convex, with regular rows of large reticulate foveæ without intervening granules: interval 1 without granules but with a single row of depressed setæ; interval 2 with only a short apical row of three or four very small tubercles, that at the summit of declivity much larger than the rest; interval 3 with a costa to beyond middle and continued to apex in the form of small separate tubercles, the largest being at the top of the declivity (in a varietal form this costa is replaced by a row of small separated tubercles); intervals 4 and 6 smooth or with a few isolated tubercles; 5 and 7 with complete rows of small conical remote tubercles;

scaling dense, uniform brown; tubercles bare at apex, each with a thick whitish depressed seta. *Legs* thin, densely covered with brown scaling and with scattered white setæ; posterior tarsi narrow, the three basal joints of equal width, second and third equal, first rather longer.

ORANGE COLONY: Bothaville (*Dr. H. Brauns*).

I owe all my examples of this species to the kindness of my friend Dr. Brauns. The only insect with which it can be confused is *quadrinodis*, Fåhr., in which, however, the costa on interval 3 of the elytra terminates abruptly at the declivity, without any apical tubercles, and interval 7 is simply carinate and not tuberculate.

### *Hipporrhinus vicinus*, sp. n.

Long. 10, lat. 5 millim.

*Head* densely covered with brown scaling, convex, forehead without fovea or carina; anteocular furrows absent. *Rostrum* not incised at base, short and thick, shorter than the prothorax alone, deflected but scarcely curved, a little more slender in male than in female. Upper surface with a stout basal tubercle which has its sides subparallel and its apex sharply bifurcated; anterior portion almost plane, rugosely punctured, and with a faint carina running from the middle back to the apex of tubercle; lateral sulci indistinct, the upper pair uniting at base; scrobes shallow, lateral, and oblique; inferior basal furrow very deep. *Antennæ* with scape reaching to about middle of eye; joints 1 and 2 of funicle subequal. *Prothorax* rather transverse, apex about as wide as base, sides strongly rounded, broadest about middle, ocular lobes very slight. Upper surface convex, closely set with setigerous granules, central furrow almost obsolete; granules black and shiny, interstices with brown scaling, except for three pale longitudinal lines. *Elytra* short ovate, broadest before middle, shoulders sloping, apex bluntly rounded in male, subacuminate in female, apical processes absent. Upper surface distinctly sulcate, sulci with rows of ocellated punctures, without intervening granules, and often hidden by the scaling; intervals finely carinate, especially 3, 5, and 7, which are rather higher than the others; intervals 1 and 2 with no granules but with regular rows of recumbent setæ; the other intervals have rows of minute setigerous granules which disappear near apex and are there replaced by depressed setæ; scaling dense, variegated brown and grey, granules black and shiny. *Legs* with thin pale scaling and without a femoral ring; posterior tarsi broad, first joint longer than second or third which are subequal, but the latter slightly broader.

NATAL: Estcourt.

I found this species fairly common near Estcourt, where it seems to replace the nearly allied *talpa*, Fåhr., which differs in having the intervals on the elytra less raised and of even height, and in having a fovea on the forehead. Prof. Aurivillius first drew my attention to the specific distinction of *vicinus*, and kindly gave me one of the original examples of *talpa* captured by Wahlberg.

### *Hipporrhinus laticeps*, sp. n.

Long. 10, lat. 4 millim.

*Head* densely covered with brown scaling, convex on vertex, forehead broad, flattened and with a short central carina; eyes prominent; anteocular furrows short and narrow, but distinct. *Rostrum* not incised at base, short and thick, about as long as prothorax only, scarcely curved. Upper surface convex, with five thin undulating carinæ, which are black and shiny, the three central ones being of the same height; the intervals closely punctured and clothed with dense brown squamæ; lateral sulci distinct, the upper pair much broader and converging at base, which is evidently raised; scrobes lateral, but oblique; inferior transverse basal furrow absent. *Antennæ* piceous, finely pubescent; scape just reaching anterior margin of eye; the two basal joints of funicle subequal. *Prothorax* transverse, its length about equal to the width at base, which is scarcely broader than apex, anterior margin deeply sinuate, sides moderately rounded, broadest about middle, ocular lobes very slight. Upper surface convex, closely set with rounded granules, leaving a narrow central furrow without any carina; granules bare, shiny, each with a subdepressed seta; interstices with brown scaling and a paler central line. *Elytra* elongato-ovate, rather acuminate apically in female, shoulders not sloping but rounded, sides scarcely ampliated, broadest about middle, apical processes absent. Upper surface almost plane on disk, faintly sulcate, the sulci containing small shallow punctures which are quite hidden by the scaling; all intervals similar, having single rows of minute black granules bearing subdepressed setæ; scaling dense, uniform grey-brown. *Legs* with long whitish pubescence; posterior tarsi narrow, setose, joint 2 rather narrower than 1 and 3, distinctly shorter than 1, but about equal to 3.

CAPE COLONY: Port Elizabeth (*Dr. H. Brauns*).

This species is most nearly related to *arenarius*, Fåhr., and *setiferus*, Gyl. The former differs in having the base of the rostrum more strongly raised and the inferior basal furrow is present; the prothorax has its sides strongly rounded and the apex is much narrower than the base; the elytra are much broader, with the shoulders sloping, the sides strongly rounded, and the punctures and intervening granules in the sulci clearly visible through the scaling. Gyllenhal's species has a much narrower, rather longer, and more curved rostrum, on which the inner pair of carinæ is parallel and not convergent towards base; the prothorax is much less transverse, the anterior dorsal margin is truncate, and the ocular lobes strongly developed; the elytra are of much the same shape, but broader, the sulci are granulate and the granules on the intervals are much more numerous, more prominent, and less regular.

### *Hipporrhinus incertus*, sp. n.

Long. 10, lat. 4½ millim.

*Head* with dense brown scaling, vertex convex and closely punctured, forehead strongly depressed, indistinctly punctured and without fovea or carina; anteocular furrows obsolete. *Rostrum* not incised at base, short and thick, about as long as prothorax only, deflected and scarcely curved. Upper surface with a stout basal tubercle, which has its sides subparallel and its apex sharply bifid; anterior part slightly excavated, closely punctured and with a narrow but distinct central carina, which ascends the tubercle; lateral sulci meeting at base, the upper pair broad and shallow, the lower narrower and deeper; scrobes lateral, oblique and curved; inferior transverse furrow broad and deep. *Antennæ* with scape reaching the posterior margin of eye; the second joint of funicle rather longer than first. *Prothorax* transverse, its length equal to the width of both base and apex, sides rounded, broadest about middle, ocular lobes very little developed. Upper surface convex, fairly closely set with small separated conical tubercles, arranged in more or less irregular longitudinal rows, and leaving a narrow central furrow without any carina; tubercles black, shiny, and each with a depressed seta; interstices with uniform brown scaling. *Elytra* ovate, shoulders sloping, broadest before middle, female more acuminate apically than male, apical processes absent. Upper surface convex, with faint striæ containing rows of indistinct punctures, sometimes separated by minute granules: intervals 1, 3, 5, and 7 with regular and complete rows of granules;

intervals 2, 4, and 6 without any, or at most a few isolated, granules; granules black, shiny, each with a depressed seta; scaling thin, uniform brown. *Legs* black, with sparse brownish-grey scaling and a paler ring near apex of femora; posterior tarsi with joints 2 and 3 subequal.

MASHONALAND: Salisbury and Marandella's.

From its nearest allies, *talpa*, Fåhr., and *vicinus*, Mshl., this species may be recognized by the sparser and more elevated granules on the prothorax, the almost entire absence of granules on intervals 2, 4, and 6 of the elytra, and the much larger and more distant granules on the remaining intervals. From other small species having a rostral tubercle, such as *corniculatus*, *nasutus*, and *armatus*, Fåhr., it may best be distinguished by the fact that the scape extends well beyond the anterior margin of the eye.

### *Hipporrhinus aculeatus*, sp. n.

Long. 12, lat. 5 millim.

*Head* broadly and deeply excavated; densely clothed with brown scaling, with the vertex, a narrow central line, and a ring round the eye paler and with a metallic reflexion; a short fine central stria between the eyes; anteocular furrows narrow but deep, approximated dorsally. *Rostrum* not incised at base, as long as head and thorax, deflected and slightly curved, its upper outline very strongly angulated beyond middle. Upper surface convex, densely covered with pale scaling, 5-sulcate, the carinæ edging the central furrow being gradually raised so as to form a sharp angular prominence beyond middle. Lateral sulci deep and distinct, the upper pair meeting at base; scrobes straight and directed beneath base of rostrum; basal transverse furrow beneath present, but not strongly marked. Prothorax as long as its width at base, very little narrower at apex, sides not much rounded, broadest about middle, ocular lobes moderately developed. Upper surface not very convex, with a broad median furrow (without a carina) and three regular rows of long, cylindrical, spine-like tubercles, each row containing five. The whole surface densely clothed with brown scales, except the extreme apices of the tubercles, each of which bears a long depressed seta. *Elytra* elongato-ovate, sides not much rounded, broadest about middle, apical declivity longer and more abrupt than usual, no apical processes. Upper surface very convex, with regular rows of punctures (somewhat obscured by the dense brownish scaling); the intervals slightly and equally costate, each with a regular row of small, scale-covered, setigerous granules, those on interval 2 slightly cristate on the declivity only. *Legs* elongate, with dense grey scaling and scattered pale setæ; posterior tarsi with the second joint a little narrower than the others, second and third subequal, first slightly longer. *Antennæ* with scape barely reaching eye; the two basal joints of funicle subequal.

CAPE COLONY: Grahamstown (*coll. Pascoe*).

This species is closely allied to the aberrant *H. thoracicus*, Fåhr., from which it is distinguished among other points by the dorsal angulation of the rostrum, the more deeply excavate head, the more declivous and less strongly costate elytra, and the shorter tarsi; but the most interesting distinction lies in the direction of the scrobe, which is purely lateral in *thoracicus*, but directed beneath the base of the rostrum in *aculeatus*.

### *Hipporrhinus bimaculatus*, sp. n.

Long. 10·5–12, lat. 4·5–5·5 millim.

*Head* convex, closely and distinctly punctured, and with thin yellowish scaling; forehead with a small, bare, smooth spot near base of rostrum; anteocular furrows absent. *Rostrum* not incised at base, as long as prothorax only, scarcely curved. Upper surface convex, with a fine, smooth, central carina and two, much less distinct, on either side; the upper pair of lateral sulci meeting at base, where the central part of the rostrum is sharply raised, so as to form a rudimentary basal tubercle; the scrobes are shallow, entirely lateral, and oblique; no transverse basal furrow beneath. *Antennæ* rather longer in the male, black, with grey pubescence; scape reaching the posterior margin of eye; the two basal joints of funicle subequal. *Prothorax* in the male a little broader than long, the length being equal to the width of both base and apex; in the female distinctly transverse, the length being shorter than the width of base or apex; sides strongly rounded, broadest about middle, ocular lobes almost obsolete. Upper surface convex, closely set with low granular tubercles, each bearing a depressed seta, and leaving a very narrow central furrow, without any carina. Scaling brown, with three narrow white lines, one central, the others lateral. *Elytra* ovate and acuminate in female, ellipsoidal and narrower in male, jointly rounded at apex, shoulders sloping, sides rounded, broadest rather before middle. Upper surface convex, with shallow striæ containing regular rows of small punctures; intervals all equally raised, each bearing a single row of shiny setigerous granules, which are largest near base and rapidly diminish in size towards apex. Scaling dense, variegated brown and grey, with a small but conspicuous white spot at the declivity on the third interval. *Legs* with fine grey pubescence; intermediate tibiæ curved internally just before apex, but much more markedly so in the male; this sex also has the posterior tibiæ very strongly compressed laterally just before apex; posterior tarsi with the second joint a trifle narrower than the others, second and third subequal, first joint very long and broad in male, longer than second and third together, but normal in female.

MASHONALAND: Salisbury.

A plentiful species about Salisbury, usually feeding on a common herbaceous plant (*Pseudarthria* sp.). It is nearly allied to *varius*, Fåhr., but that species has no trace of a rostral tubercle, the elytra are more acuminate in both sexes, and the granules are obsolescent on the disk; the intermediate tibiæ are not nearly so incurved; and the male has the posterior tibiæ and tarsi normal. The compression of the posterior tibiæ in *bimaculatus* distinguishes it from every other species in the genus known to me.

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## LXI.—*On a Collection of Snakes from North-western Argentine and Bolivia containing new Species.* By Dr. EINAR LÖNNBERG.

BARON ERLAND NORDENSKIÖLD, having returned this summer from an expedition to the Bolivian Chaco and North-western Argentine, has delivered to me for determination a collection of snakes containing sixteen species, two of which seem to be new and which I venture to describe in the following pages; but as the region visited is very little known zoologically except through the collections brought home to Europe by Dr. Borelli[*], I append the full list of species of this collection.

The places where Baron E. Nordenskiöld and his companions made the principal collections were the following:—

Quinta, S. Barbara, near Laguna de la Brea, Province de Jujuy, North-western Argentine: luxuriant subtropical forests.

Moreno, Puna de Jujuy, Argentine, 3500 m. above the sea-level: stony desert, with a sparse vegetation of shrubs.

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[*] *Conf.* Peracca, Boll. Mus. Zool. Anat. Comp. Torino, 1897, vol. xii. no. 247.

Fortin Crevaux, Bolivian Chaco near Pilcomayo: dry woods with spiny Mimosaceæ &c.

Tatarenda, Caiza, Bolivian Chaco: on the border between the dry woods and the subtropical forest, partly broken up in groves separated by grassy areas.

### *Drymobius bifossatus*, Raddi.

Four specimens from Tatarenda, Bolivian Chaco.

### *Leptophis rostralis*, sp. n.

A young specimen of this genus seems to represent a hitherto unknown species, and I name it therefore, at least provisionally. It does not agree with any of the descriptions in the literature, but might perhaps turn out to be the young stage of some other species, although that, too, does not seem probable.

The loreal is absent, the obliquely disposed scales are smooth and arranged in fifteen rows. The ventrals are distinctly angulate laterally. The rostral is broadly visible from above. Already the combination of these characteristics seems to suffice to distinguish it from the hitherto known species of *Leptophis*, but a full description will make the distinction still more plain.

Head moderately elongate, a little more than twice as long as broad. Eye rather large, its length equalling its distance from the nostril. Rostral broader than deep, the portion visible from above almost equalling two thirds the length of the internasals. Internasals much shorter than præfrontals, about equalling two thirds the length of the latter. Frontal about once and a half as long as broad, longer than its distance from the snout, but shorter than the parietals. Nasal elongate, semidivided. No loreal; præfrontal in contact with second and third labials. One præocular, not reaching the frontal; two postoculars. Temporals 1 + 1. Eight upper labials, fourth and fifth entering the eye. Five lower labials in contact with the anterior chin-shields, which are a little shorter than the posterior. Scales in 15 rows, all smooth, although in the posterior part of the body a faint trace of a keel may be discerned on some scales of the median and adjoining rows, more seldom on others. Ventrals distinctly angulate laterally, 167 in number. Anal divided; subcaudals 148. General colour bronzy above, because the scales are densely mottled with bronzy or golden, so that the bluish (green) ground-colour is not conspicuous unless under a magnifying-glass, and then mostly at the base. On the anterior part of the body a series of oblique dark stripes are seen running from the back and sloping down the sides in a backward direction. These stripes are regularly arranged and are formed in such a manner that the tip and more or less of the upper part of every third scale is blackish. Posteriorly the body and the tail are uniformly bronzy. The upper head-shield bluish, mottled with bronzy and black-edged. Upper labials and lower parts, including the outer row of scales, whitish, but posteriorly and under the tail the colour becomes more greyish.

The only specimen was collected at San Miguel. It measures 36 centim.

### *Liophis pœcilogyrus*, Wied.

Six (mostly young) specimens from Tatarenda, Bolivian Chaco.

### *Xenodon Merremii* (Wagler), Blgr.

Several specimens from Tatarenda.

The largest specimen measured 94 centim. This and three others had the usual spotted appearance. A fifth specimen, measuring 82½ centim. in length, does not show any markings at all, being uniformly light brown above and dirty yellowish beneath. The next smallest specimen, measuring 63 centim. in length, has the markings very well developed and shows a remarkable likeness in pattern and mimicry to *Lachesis Neuwiedi*, which lives in the same region. The youngest specimen, measuring about 31½ centim., has the cross-bands constricted in the middle only in the anterior part of the body. The small spots of the lateral series become on the posterior part of the body and the tail confluent into a dark stripe.

### *Lystrophis semicinctus*, Dum. & Bibr.

Three specimens from Crevaux, near Pilcomayo, Bolivian Chaco, and others were observed at different places.

### *Rhadinæa sagittifera* (Jan).

Numerous specimens from Tatarenda and Crevaux, Bolivian Chaco.

The specimens agree as regards their coloration with Peracca's * description, the large individuals having the back quite or almost unspotted; but the young ones have numerous more or less confluent spots on the back and along the sides &c., as the author quoted states. On some specimens there are quite fine minium-red stripes between the scales, which stripes on the tail become broader and encroach more on the scales, so that the tail appears almost brick-red towards the end.

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* Boll. Mus. Zool. Anat. Comp. Univ. Torino, vol. xii. (1897).

### *Rhadinæa occipitalis*, Jan.

A small specimen from Tatarenda.

### *Oxyrhopus rhombifer*, Dum. & Bibr.

A beautiful specimen from Quinta, Province de Jujuy, Argentine. It is not recorded in Berg's "Fauna Erpetologica Argentina" (An. Mus. Nac. de Buenos Aires, t. vi. 1898).

This snake, as well as *Lystrophis semicinctus*, may be said to strikingly mimic *Elaps* in their coloration.

### *Oxyrhopus clœlia* (Daudin).

A large black specimen (160 centim.) from Tatarenda, Bolivian Chaco.

### *Tachymenis peruviana*, Wiegm.

Two specimens of this snake were collected near Moreno, Puna de Jujuy, Argentine, 3500 m. above the sea-level.

### *Philodryas Erlandi* *, sp. n.

Eye a little longer than half its distance from the end of the snout (in the young its length equals its distance from the nostril). Snout a little prominent and obliquely truncate. Rostral much broader than high, just a little visible from above. Internasals shorter than præfrontals. Frontal not quite once and a half as long as broad, a little longer than its distance from the snout, not quite as long as the parietals (almost as long in the young). Loreal longer than deep. One præocular, not reaching the frontal. Two postoculars. Temporals 1 + 2. Eight upper labials, fourth and fifth entering the eye. Five (four in the young) lower labials in contact with the anterior chin-shields, which are of equal size with the posterior ones. Scales smooth (with single apical pits), in 19 rows. Ventrals only very obtusely angulate, 230–236; anal divided; subcaudals 140–150. Bluish green anteriorly

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* I take the liberty of dedicating this species to my friend Baron Erland Nordenskiöld.

(in spirit), becoming light greyish brown towards the posterior half of the body; tail paler, being in the older specimen light brownish grey, in the younger more reddish, almost dull brick-red. The younger specimen is also more brownish or olive on top of the head and neck, so that the bluish-green colour is most prominent on the sides of the neck and body, where the scales have that colour, but are edged with light brownish. A blackish stripe extends from the nostril, through the lower part of the eye along the upper margin of the upper labials, which otherwise are whitish. This dark stripe disappears on the neck. Below greenish blue anteriorly, becoming more greyish (or reddish in the younger one) posteriorly; a whitish band occupies the lateral ends of the ventrals and the lower half of the outer row of scales. This band is conspicuous to the anus, where it disappears. The tail has about the same coloration below as above, only lighter below.

The larger specimen from Crevaux, Bolivian Chaco, measures 74½ centim. in total length, the tail is 23½ centim. The smaller specimen is from Tatarenda *.

### *Elaps frontalis*, Dum. & Bibr.

I refer to this species a rather large specimen from Tatarenda measuring about 124 centim. It has eight sets of black annuli; upper head-shields black, edged with yellow; only three lower labials in contact with the anterior chin-shields; tail ending very obtusely. With these characteristic features it combines, however, a rather large number of shields, namely, ventrals 246 and subcaudals 28. I think, however, that this does not prevent the identification from being correct, because the variability of the species seems to be rather large with regard to the number of shields.

### *Leptognathus Mikani* (Schleg.).

One specimen from the Bolivian Chaco.

### *Leptognathus turgida*, Cope.

Three specimens from Tatarenda, Bolivian Chaco.

### *Lachesis Neuwiedi*, Wagler.

Three specimens from Quinta, Province de Jujuy, Argentine, and six from Tatarenda, Bolivian Chaco.

It is known under the name of "Vibora."

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* I have had the pleasure of consulting Mr. G. A. Boulenger concerning this new species, and beg therefore to offer him my thanks for his kindness.

*Crotalus terrificus* (Laur.).

A specimen without any distinct markings on the neck. It resembles thus, in this respect, the more northern form. The specimen recorded by Boulenger in Cat. Snakes Brit. Mus. from Bolivia had the "stripes on the neck well-marked" (*l. c.* p. 575). It is not recorded by Peracca from Borelli's collection (*l. c.*) nor by Boulenger * from Boggiani's collections in the northern Chaco. Dr. Rob. Fries, the botanist of the Swedish expedition, told me about the death of two Bolivians caused by the bite of the "cascavella."

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## LXII.—*Some Recent Additions to and Notes on the Crustacean Fauna of New Zealand.* By George M. Thomson, F.L.S.

In view of the proposed publication of the 'Index Faunæ Novæ-Zealandiæ' under the editorship of Captain F. W. Hutton, it is desirable to record the occurrence of any species which have recently been identified as occurring in these islands, and which have already been described elsewhere. The following species of Crustacea have hitherto not been recorded from New Zealand.

### BRACHYURA.

### Family **Macrophthalmidæ.**

### Genus Macrophthalmus, Latr.

*Macrophthalmus hirtipes.*

*Cleistostoma? hirtipes*, Jacquinot et Lucas, Voy. au Pôle Sud, vol. iii. p. 68, pl. vi. figs. 3 & C.

This crab, originally described from Samoa, has hitherto been confused with *Hemiplax hirtipes*, Heller, a species from which it is quite distinct. It occurs commonly in Otago Harbour, Akaroa, and Port Cooper, and is usually found between tide-marks.

### Family **Leucosiidæ.**

### Genus Ebalia, Leach.

*Ebalia tuberculosa*, A. Milne-Edwards.

*Ebalia tuberculosa*, A. Milne-Edwards, 'Challenger' Brachyura, p. 306, pl. xxv. fig. 1.

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* Ann. Mus. Civico Genova, s. 2, vol. xix. (1898).

This species was hitherto only recorded from New Zealand in the Report of the 'Challenger,' numerous specimens having been taken at Station 167, about 150 miles west of New Plymouth, in 150 fathoms. I have recently received several specimens collected by Mr. R. Henry in over 40 fathoms, in Dusky Sound.

## AMPHIPODA.

### Family **Lysianassidæ.**

### Genus AMARYLLIS, Haswell.

### *Amaryllis macrophthalmus*, Haswell.

*Amaryllis macrophthalmus*, Haswell, Cat. Australian Crust. p. 227.

I have identified specimens from Moko-Hinau taken by Mr. Sandager; and from Lyttelton, where one was collected by Dr. Chilton.

### Family **Phoxocephalidæ.**

### Genus PHOXOCEPHALUS, Stebbing.

### *Phoxocephalus bassi*, Stebbing.

*Phoxocephalus bassi*, Stebbing, 'Challenger' Amphipoda, p. 811, pl. liv.

This species is described from a single specimen taken on the surface in Bass Straits. I have the same species among surface-net collections taken in Otago Harbour by Dr. Chilton.

### Family **Eusiridæ.**

### Genus LILJEBORGIA, Spence Bate.

### *Liljeborgia Haswelli*, Stebbing.

*Liljeborgia Haswelli*, Stebbing, 'Challenger' Amphipoda, p. 985, pl. xcii.

A single specimen was collected by me in the Bay of Islands many years ago; but recently, in trawling off Otago Heads and in Tasman Bay, the species has been commonly met with living in pairs in the upper whorls of shells occupied by hermit-crabs. In the southern locality it was always associated with *Eupagurus novæ-zealandiæ*, Dana, but in Tasman Bay with *E. rubricatus*, Henderson. It is a strikingly coloured species, the anterior half of the body being bright pink or red and the posterior white.

### Genus EUSIRUS, Kröyer.

#### *Eusirus longipes*, Boeck.

*Eusirus longipes*, Boeck, 'Challenger' Amphipoda, p. 965, pl. lxxxvii.
*Eusirus cuspidatus*, Kröyer, var. *antarcticus*, mihi.

The species was originally wrongly identified by me. There is no doubt it is the same as the northern species. The solitary 'Challenger' specimen was collected at Kerguelen.

## Family **Ampeliscidæ.**

### Genus AMPELISCA, Kröyer.

#### *Ampelisca acinaces*, Stebbing.

*Ampelisca acinaces*, Stebbing, 'Challenger' Amphipoda, p. 1036, pls. ci. & cii.

Stebbing's description was drawn up from a solitary female specimen obtained in Port Jackson at a depth of 35 fathoms.

The species is not unfrequently found washed up on the ocean beach, Dunedin, often in considerable numbers. It is probably therefore a pelagic form.

## Family **Photidæ.**

### Genus AUTONOE, Bruzelius.

#### *Autonoe kergueleni*, Stebbing.

*Autonoe kergueleni*, Stebbing, 'Challenger' Amphipoda, p. 1087, pl. cxi.

Several male specimens of this species were collected by me in the Bay of Islands. The species was originally described and figured by Stebbing from a single specimen taken off Cumberland Bay, Kerguelen, in 127 fathoms.

## Family **Phliadidæ.**

### Genus IPHINOTUS, Stebbing.

#### *Iphinotus typica*, Thomson.

*Iphigenia typica*, Thomson, Trans. N. Z. Inst. vol. xiv. p. 237.
[ *Iphinotus Chiltoni*, Stebbing, Trans. Linn. Soc., Zool. vol. vii. p. 419, pl. XXXV. B.

The name *Iphigenia* having been preoccupied, Stebbing suggested the new genus *Iphinotus* to receive a species resembling *I. typica*, which he named *Iphinotus Chiltoni*. But a re-examination of my original species shows that I wrongly described certain features, and convinces me of the identity of the two species. The name therefore must stand as above. The species has been found only rarely in Otago Harbour.

### Order COPEPODA.

#### Family **Calanidæ.**

#### Genus GUERNEA, Thomson.

In 1895 I described and figured a new Copepod from Macquarie Island as *Guernea antarctica.* In accordance with a suggestion received from my friend Rev. T. R. R. Stebbing, I propose the name *Deguernea* for the new genus, as the former is already preoccupied.

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## LXIII.—*Some* Coccidæ *from Mexico.*

By T. D. A. COCKERELL.

THE Coccidæ herein discussed were all collected in the summer of 1902 by Professor C. H. Tyler Townsend, to whom we have also in former years been greatly indebted for additions to the Coccid fauna of Mexico[*].

### *Erium zapotlanum*, sp. n.

♀.—Gregarious on the leaves, in loose globular snow-white sacs, about 3 millim. diam., which adhere to anything they touch. Boiled in KHO, turns crimson, but only slightly stains the liquid; ♀ cleared and mounted about 1800 μ long and 1000 broad. Anal ring with six bristles; dorsal surface with small spines (about 18 μ long) in rows, far apart; sides with many minute glands; ventral surface with fewer but larger circular glands and a very few bristles; labium dimerous, about 100 μ long and 81 broad; legs and antennæ pale, no denticle on inner side of claw; antennæ 7-jointed. Measurements of legs and antennæ in μ:—Femur + trochanter 186; tibia 150; tarsus 69; claw 27. Antennal joints: (1) 30, (2) 30, (3) 33, (4) 27, (5) 25, (6) 27, (7) 66.

*Hab.* Zapotlan, July 7, on "Huele de Noche."

Allied to *Erium eriogoni* (*Dactylopius eriogoni*, Ehrhorn) from California, but the female is of a different colour, and there are other differences obvious upon close comparison. I am not quite sure that we do well to accept the genus *Erium* as distinct from *Dactylopius* (i. e. *Pseudococcus*, Westw.); if it is accepted it would seem that it ought to include also *Irishi*, *Steelii*, *lichtensioides*, and *neomexicanus*. It is easy enough to group together these species which have a complete sac, but there remains a doubt whether they are as intimately related as their superficial appearance would suggest. *E. Steelii* (Ckll. & Towns.) was found by Townsend on May 3 at Ojo de San Diguela in Chihuahua. Its antennal joints measured thus: (1) 42–45, (2) 40–45, (3) 36–42, (4) 21–27, (5) 24–33, (6) 27, (7) 36–40, (8) 84–87.

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[*] Including the species now reported, 161 Coccidæ are known from Mexico. Of these, 96 have proved new to science, their discoverers being, so far as known, as follows:—Townsend, 51; Koebele, 26; Dugès, 6; Cockerell, 3; Sallé, 2; Llave, Herrera, Palmer, 1 each.

### *Takahashia jaliscensis*, T. D. A. & W. P. Ckll., sp. n.

♀.—Ovisac pale yellowish, firm, standing straight out from branch, about 13 millim. long and 6 broad, with the shrivelled female on the end. Female after boiling dark brown (nearly clear after prolonged boiling), circular, about 6 millim. diam.; margin with sharp spines as in *Lichtensia*, about 30 $\mu$ long and as far apart as the length of one; skin with numerous minute glands; anal plates ordinary, but quite broad, about 240 $\mu$ long; legs strongly coloured; femur + trochanter 315 $\mu$, tibia 219, tarsus 132; claw about 45 $\mu$ long, very large and very stout at base; tarsal digitules extremely fine, about 75 $\mu$ long, with minute knobs; claw-digitules extending far beyond claw, as far as tarsal digitules, very slender, with small knobs; antennæ short, more or less rudimentary, 5- to 7-jointed, length 210 $\mu$ or more; in the 5-jointed form the last four joints measure in $\mu$: (2) 30, (3) 54, (4) 90, (5) 60; in the 6-jointed 4 is divided, and we have (4) 42, (5) 30, (6) 60; in the 7-jointed 6 is divided.

*Embryonic larva* with 6-jointed antennæ, the joints measuring in $\mu$: (1) ?, (2) 30, (3) 24, (4) 24, (5) 36, (6) 51. The young are ochreous, with two broad longitudinal black stripes; the cephalic end is abruptly narrowed, and the black stripes are replaced by mere lines; eyes black and conspicuous.

*Hab.* Barranca de Atenquique, Jalisco, July 9, on "Copal." The leaves of the plant are pinnate, with about eleven to twelve pairs of leaflets. The plant is, perhaps, a *Rhus*, as suggested by Townsend.

The discovery of *Takahashia* in Mexico is very surprising; the genus has hitherto been represented by a single species found in Japan. A new study of the genus shows that it is derived from *Lichtensia*, not from *Pulvinaria*, as formerly supposed. *Exæretopus* is also related to *Lichtensia*.

### *Lichtensia colimensis*, sp. n.

♀.—Ovisac white. Skin with numerous large colourless oval pits, 15–21 μ long; spiracles large, the outer ring about 75 μ diameter; margin with numerous sharp spines, as in the other American members of the genus; anal plates ordinary, about 165 μ long; legs and antennæ light brown; claw-digitules with large knobs, extending considerably beyond claw; tarsal digitules as in *L. crescentiæ*; hind tarsus with a constriction; antennæ 8-jointed. Measurements of legs and antennæ in μ:—Anterior leg—femur + trochanter 195, tibia 135, tarsus 63; hind leg—femur + trochanter 213, tibia 135, tarsus 75–81. Antennal joints: (1) 30, (2) 36–45, (3) 66–72, (4) 37–45, (5) 36–42, (6) 33–35, (7) 30, (8) 39–45.

*Hab.* Colima, July 12; on *Celtis* (?).

The antennæ are as in *L. lycii*, except that joint 2 is longer; the tibia and tarsus are too small for *L. crescentiæ* or *mimosæ*, but agree pretty well with *lycii*. The constriction of the anterior tarsus is a little before the middle in *lycii*; in *colimensis* a similar constriction exists, but a little beyond the middle.

### *Lichtensia zapotlana*, sp. n.

♀.—Ovisac long, pure white, narrow, firm, not adhering to objects; length 6, breadth 2 millim. ♀ covered with an easily deciduous glassy secretion; the insect is very dark brown and very hard to clear, remaining dark after prolonged boiling in KHO. Anal plates ordinary; marginal spines sharp, about 30 μ long, and as far apart as the length of one; anterior leg with femur + trochanter 330, tibia 204, tarsus 100 μ; antennæ 8-jointed, (1) 45, (2) 33–35, (3) 111–114, (4) 69–81, (5) 60–66, (6) 39–40, (7) 30–32, (8) 45–51.

♂.—Scale glassy, roughish, with a subreticulate appearance, dorsal area (between the longitudinal lines) about equal to either lateral area. ♂ reddish, marked with black; costa with a greyish-red stripe.

*Hab.* Zapotlan, July 7, on a leguminous shrub.

Seems near to *L. argentata*, Hempel. *Pulvinaria parvula*, Ckll., is also allied, and should stand as *Lichtensia parvula*: it is a smaller insect than *zapotlana*, but has even larger legs. It appears that in tropical Mexico (and possibly in the whole Neotropical region) *Lichtensia* takes the place of *Pulvinaria*, the species of the latter genus found there being introductions from elsewhere. There are genuine species of *Pulvinaria* at present found only in the West Indies and Brazil, but it is not impossible that they came from other regions where they have not yet been observed.

### *Lichtensia lutea* (Ckll.).

San Geronimo, Colima, Aug. 1, on "Orteguilla," *Ficus* sp.

### *Toumeyella mirabilis* (Ckll.).

Cerro, Chilicote, Chihuahua, April 29, on *Prosopis*.

### *Tachardia larreæ* (Comst.).

Plain at west base of Cerro Chilicote, Chihuahua, April 25, on *Larrea*.

### *Prosopophora manihotis*, Townsend.

Zapotlan, Jalisco, July 6, on *Mimosa* sp., and July 7 on *Leucæna* sp.

Boiled in KHO they exhibit a reddish-purple colour: diameter of mouth-parts 165 μ; caudal bristles about 70 μ long; antennæ 8-jointed, very variable, one measured gave (1) a mere ring, (2) 24, (3) 39, (4) 39, (5) 51, (6) 21, (7) 15, (8) 10.

I think this is likely to prove a synonym of *P. prosopidis*, Maskell, but the description and figures given by Maskell are unsatisfactory.

### *Asterolecanium Townsendi*, sp. n.

♀.—On the twigs of the plant, not making pits. Scale about 2 millim. diam., convex, circular, not carinate, or with sometimes traces of a keel posteriorly; colour bright opaque lemon-yellow; a slight irregular fringe of white rods, not all in one plane.

♀.—Turns crimson on boiling in KHO: diameter of mouth-parts about 120 μ; skin crowded with figure-of-8 glands; margin with a row of figure-of-8 glands (about 10 μ diam. and 10 apart) and a more or less double row of simple glands.

♂.—Scale elongate, about $1\frac{1}{2}$ millim. long and $\frac{2}{3}$ broad; similar to female scale in colour and texture, fringe more regular and distinct. ♂ (dry, from under scale) reddish, with a long caudal spike, as in the Diaspinæ; wings broad and ample, head broad, thorax very broad. Length of caudal spike 210 μ; breadth of thorax 420; breadth of wing 495.

*Hab.* Platanas, Jalisco, on "Guasima," Aug. 4.

Compared with *A. viridulum* the scales are larger and much more opaque. *A. Townsendi* really looks most like the European *A. fimbriatum*, but that has a double row of figure-of-8 glands on the margin.

### *Eriococcus aurescens*, sp. n.

♀.—On twigs of "Guasima." Sac about 3½ millim. long, of the usual form, dense, but with a surface like a rough blanket; colour of sac a light reddish yellow, a sort of light apricot-colour. ♀. Boiled in KHO turns dull crimson, and stains the liquid light amber; globular or nearly so; antennæ and legs brown; spines numerous and large, about 48 $\mu$ long; caudal tubercles narrow and cylindrical, about 90 $\mu$ long and 45 broad at base, each emitting a stout bristle about 210 $\mu$ long; bristles on inner side of tibia and tarsus large. Measurements of legs and antennæ in $\mu$:—Anterior leg—femur + trochanter 186, tibia 105, tarsus 120; middle leg—tibia 144, tarsus 159. Antennal joints: (1) 30–39, (2) 33–39, (3) 51–60, (4) 36–48, (5) 27-33, (6) 24–27, (7) 36–37. One antenna showed only six joints, with a long third joint (93 $\mu$), the suture between 3 and 4 being practically obliterated.

*Hab.* Platanas, Jalisco, Aug. 4.

It has a dipterous parasite. The species is easily recognized by the colour of the sac; the 6-jointed aberration resembles the normal form of *E. cryptus* (Ckll.), which often has a yellowish ovisac.

### *Cryptokermes brasiliensis*, Hempel.

Zapotlan, July 6, on *Mimosa* sp.

Previously known only from Brazil, whence I have specimens sent by Mr. Hempel. The early stages were not known, but are well represented in the Mexican material.

*Egg.*—Crimson, greatly elongated, about 285 $\mu$ long and 90 wide.

*Newly hatched larva.*—Pale crimson (after boiling in KHO), greatly elongated (about 285 $\mu$ long and 90 wide), without rows of spines, but with longitudinal rows of figure-of-8 glands; legs and antennæ well developed; caudal tubercles not elongated; anal tube present, but broad and shallow, with the anal lobes projecting; tibia very short; anterior legs with tibia about 8, tarsus 21 $\mu$; a very long filiform digitule (21 $\mu$) at end of tarsus.

*Second stage.*—Scales on twigs, broad oval, composed of the same granular yellowish lumps as the adult scale, but largely surrounded by white cottony filaments; a rather long white rod projects at hind end. The insect itself (dried specimens) is about 225 μ long and 150 broad (doubtless much longer in life); segmentation of abdomen strongly marked; a long white rod projecting from anal tube (as in *Antonina* and *Ourococcus*); the three last abdominal segments have on each side a very long (about 300 μ) bristle, after the manner of *Icerya* larvæ; legs and antennæ very dark ferruginous; antennæ 6-jointed, with an extremely short third joint (twice as broad as long) and a very large and long club, the basal part of which is slightly constricted, so as to simulate an additional joint. Joints 2 to 4 are cylindrical, 5 is cup-shaped. Measurements in μ:—(1) 36, (2) 45, (3) 18, (4) 39, (5) 24, (6) 105.

*Third stage.*—Oval, about 1600 μ long; turns crimson on boiling in KHO. Antennæ reddish, very short and stout, of 5 or 6 obscure joints, with many short bristles at the tip. They are about 135 μ long and 60 broad, and very close together, only about 45 μ apart. Legs very short and stout. Round dermal glands very numerous and exactly as in *Sphærococcus.* The anal region is provided with a tube and is quite after the manner of *Sphærococcus casuarinæ.*

I had been quite uncertain as to the relationships of *Cryptokermes* in the absence of the early stages. It is now clear that the genus is closely related to the Australian *Sphærococcus* and *Ourococcus.*

### *Chrysomphalus* (*Melanaspis*) *tonilensis*, sp. n.

♀.—Scales on branches, about 2 millim. diam., oval to circular, strongly convex, rough, with concentric ridges, dark purplish brown to black; exuviæ large, shining black, sublateral, covered with an easily deciduous white film. Nearly spherical, about 1400 μ long, caudal end rather strongly chitinized. No circumgenital glands; dorsal glands rather numerous, minute, not over 3 μ diameter; anal orifice oval, about 21 μ long and 108 from hind end; genital orifice about 42 μ anterior to anal orifice; spines short, not over 12 μ long; no squames; three pairs of lobes, all low and broad, the second and third with a central depression or notch; a low prominence takes the place of the fourth lobe; club-shaped glands in pairs, those of each pair alike, all short, the longest only 18–21 μ long.

*Hab.* Tonila, Jalisco, Aug. 2, on stalk, branches, and root of a low bush "of sage family," with very hairy green parts.

The male scales also occurred in some numbers and are oblong, reddish brown, often conspicuously white posteriorly;

exuvia near the anterior end. Allied to *Chrysomphalus bromeliæ* (*Aspidiotus bromeliæ*, Newstead).

*Chrysomphalus albopictus* (Ckll.).

Colima, July 14, on leaves of orange.

*Chrysomphalus agavis* (Towns. & Ckll.).

Tonila, Jalisco, Aug. 7, on narrow-leafed *Yucca*. Volcan de Colima, Aug. 3, lower slopes, among pines, about 7500 ft., on *Agave*. Zapotlan, July 6 and 7, on *Agave*.

Some of the last-mentioned material is marked as collected by Townsend and Boyd.

*Aspidiotus Crawii*, Ckll.

Tonila, Aug. 3, on *Mimosa*.

*Aspidiotus cydoniæ*, Comst.

The more I see of this the more I feel assured that it is distinct from *A. lataniæ* and *A. Crawii*.

Tonila, Aug. 2 and 3, on *Lantana* and several other plants, evidently very abundant. Volcan de Colima, Aug. 3, at 7500 ft., on "Madroña" or "Manzanita." Base of Volcan de Colima, 7000 ft., on *Lantana*.

*Aspidiotus persearum*, Ckll.

Colima, July 14, on upperside of leaves of *Magnolia*. *A. persearum* was previously known only from Japan and the Sandwich Islands.

*Aspidiotus hederæ*, var. *Nerii* (Bch.).

Irapuato, July 4, on oleander.

*Diaspis cacti*, Comst.

Zapotlan, July 5, on *Opuntia*.

*Diaspis Townsendi*, Ckll.

Irapuato, July 4, on *Prosopis*.

*Mytilaspis nigra*, Ckll.

Zapotlan, July 7, on tree *Yucca* (smooth dark green leaf) and *Agave* sp. (narrow saw-edge leaf).

The specimens are smaller than the type, the female scale not over 3 millim. long, exuviæ 1 millim.; the median lobes are quite large, minutely crenulate; second lobes narrow. The male scale is brownish white, narrow, of the usual type, half the length of the female. The species is allied to *M. Gloveri.*

### *Mytilaspis mexicana*, Ckll.

Zapotlan, July 8, on *Solanum* sp.

### *Mytilaspis argentata*, Ckll.

El Salto, Cualata, Colima, July 26, on a low bush. Previously known only from Brazil.

### *Mytilaspis philococcus*, Ckll.

Zapotlan, Jalisco, on tree *Yucca* and *Agave*; Irapuato, July 4, on post cactus.

East Las Vegas, New Mexico, U.S.A.,
Sept. 28, 1902.

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## LXIV.—*Notes on the Natural History of East Finmark.* By Canon A. M. Norman, M.A., D.C.L., LL.D., F.R.S., F.L.S.

[Continued from p. 361.]

[As it was quite possible that in the introductory notes to these papers I might have fallen into some errors, I sent a proof to Herr Schneider and requested him to criticize closely. To-day (Nov. 13) I have received his reply. In respect of Mammalia:—

*Vulpes lagopus*, Linn. (Arctic Fox). The two hundred were killed by poison in one winter at Vardö (not Vadsö).

*Halichœrus grypus*, Fabr. (Grey Seal), "is still living in Finmark. A large male specimen was killed at Soœrholt this last spring. I got the splendid cranium" (Schneider).

The following are verbal corrections. My head dredger's name should be spelt Bjerkeng (not Bjerking). M. Figenschau's place should be spelt Kirkenes (not Kirchenes); Bög Fiord should be read everywhere for Bog Fiord. Two important mistakes, which I cannot tell how I came to make, are:—

Page 344, line 12, *for* "Bombyces" *read* "Bombidæ."
Page 354, line 24, *for* "north-eastern" *read* "north-western."

## MOLLUSCA (continued).

The following additional species and varieties were recorded in 1882 from Vardö and Kirkenes by J. Sparre Schneider[*]:—

*Thesbia nana*, Lovén.
*Buccinum Donovani*[†], Gray.
—— *fragile*, Verkrüzen.
—— *parvulum*, Verkrüzen.
*Buccinum Humphreysianum*, Ben.
*Sipho Sarsii*, Jeffr.
*Helcion pellucidum*, Linn.
*Gibbula cineraria*, Linn.

Since the preceding part was sent to press I have received from Herr Friele an account of the Mollusca dredged by the 'Michael Sars' in 1900[‡]. Among these are five species from the Porsanger Fiord which are additions to the fauna of East Finmark:—

*Coryphella Sarsi*, sp. n.
*Dendronotus robustus*, Verrill.
*Acera bullata*, O. F. Müller.
*Ampullina Smithii*, Brown.
*Limopsis minuta*, Phil.

The number of Mollusca of East Finmark, according to the foregoing lists, is 232; of these, 164 were found in 1890 by myself, and 68 are added on the authority of G. O. Sars, Lovén, Schneider, and Friele.

Professor G. O. Sars, in the concluding pages of his 'Mollusca regionis Arcticæ Norvegiæ,' 1878, divides the Norwegian Mollusca under the two headings of Arctic and Boreal species. Although I should myself refer a few of the species which he characterizes as arctic rather to a boreal origin (as he himself would perhaps do with our present knowledge of distribution), it may nevertheless be interesting to state that he classifies the whole of the species contained in the preceding lists as of arctic origin, with the exception of the following fourteen:—

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[*] Schneider (J. Sparre), "Nogle zoologiske-iagttagelser fra Vardö," Tromsö Museums Aarsberetning, 1882, p. 81; and *Thesbia nana*, Lovén, from Kirkenes, Schneider, "Undersögelser af dyrelivet i de arktiske fjorde. III. Tromsösundets Molluskfauna," Tromsö Museums Aarshefter, viii. 1886, p. 22.

[†] This and the two following *Buccina* I regard as varieties of *B. undatum* and *B. grœnlandicum*.

[‡] Friele (H.), "Mollusken der ersten Nordmeerfahrt des Fischereidampfers 'Michael Sars' 1900 unter Leitung von Herrn Dr. Johan Hjort," Bergens Museums Aarbog, 1902.

*Ommastrephes sagittatus.*
*Acera bullata.*
*Thesbia nana.*
*Trophon barvicensis.*
*Eulima bilineata.*
*Jeffreysia globularis.*
*Littorina obtusata.*

*Gibbula cineraria.*
*Helcion pellucidum.*
*Dentalium entalis.*
*Pecten tigrinus.*
*Dosinia exoleta.*
*Mactra subtruncata.*
*Poromya granulata.*

In 1857 Dr. Danielssen made a zoological excursion in Nordland and Finmark, and published a full account of the Invertebrata* he met with. In his list the following Mollusca are recorded from Vadsö :—

*Teredo norvegica.*
*Neæra cuspidata.*
*Thracia phaseolina*, var. *arctica.*
*Syndosmya intermedia.*
*Cardium edule.*
—— *echinatum.*
—— *nodosum.*
—— *suecicum.*
*Yoldia pygmæa.*
*Arca Korenii.*

*Pecten striatus.*
—— *similis.*
*Crania anomale.*
*Chiton asellus.*
—— *lævis.*
—— *alveolus.*
*Velutina haliotoidea.*
*Cylichna cylindracea.*
*Bulla Cranchii.*

Now of these 19 species only 2 are arctic, while 17 are boreal, and it seems impossible not to suppose that some error has been made. Moreover, Sars has not entered these species in his East Finmark column.

In 1875 Mr. Verkrüzen, after a visit to East Finmark, published a paper †, in which a list is given of Mollusca found on different parts of the Norwegian coast. The entire list contains 190 species, but of these 97 are referred to East Finmark, and include the following Mollusca which are not in the lists which I have given :—

*Utriculus obtusus.*
*Columbella nana.*
*Odostomia rissoides.*

*Odostomia acuta.*
*Rissoa albella.*
*Chiton cinereus.*

In this paper Verkrüzen described *Buccinum finmarchianum*, *Margarita bella*, and *Montacuta Maltzani.*

In the following year Kobelt described and figured some Fusidæ and other Mollusca which Verkrüzen had brought back from East Finmark †. Among the species are *Sipho Verkrüzeni*, Kobelt, *Buccinum parvulum,* Verkrüzen, and *Admete undatocostata,* Verkrüzen.

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* Danielssen (D. C.), "Beretning om er Zoologisk Reise foretagen i Sommeren 1857," Nyt Mag. for Naturvidenskaberne, vol. ii. 1861, pp. 1–58.

† Verkrüzen (T. A.), "Bericht über einen Schabe-Ausflug im Sommer 1874," Jahrb. der deutschen malakozoologischen Gesellschaft, 1875, p. 229.

In 1881 M. Jules de Guerne, accompanied by other French naturalists, went to the Varanger Fiord on a "Mission scientifique." Two papers on the expedition were published by M. de Guerne ‡. These naturalists went in their vessel 'Coligny' to Elvenes, at the mouth of the Pasvik River, in order that they might proceed thence to Lake Onega, and thus they dredged in Klosterelv Fiord. The only list of Marine Invertebrata published by them is contained in the second paper. It is one of 97 species of Mollusca, which, with the exception of "*Rissoa proxima,* Alder," are recorded in my lists.

## INLAND MOLLUSCA.

A paper entitled "Land and Freshwater Mollusca in the Arctic Regions of Norway," by Miss Birgithe Esmark §, gives the following list of the species known in East Finmark :—

*Arion subfuscus,* Drap. Mouth of the Tana River.

*Vitrina angelicæ,* Beck. Vardö.

*Hyalinia petronella,* Charp.*

*Conulus fulvus,* O. F. Müller. Vardö.

*Patula harpa,* Say. "Of this pretty little mollusk Schneider has in July found two dead specimens in the stem of a decayed birch-tree at Kirchenes in South Varanger. It was first found in North America, later in the country of Amur, but not yet in Siberia, while in Finland it goes as far as the shores of the Arctic Ocean."

*Patula pygmæa,* Drap. Vardö.

—— *ruderata,* Studer. Elvenes, in Sydvaranger.

*Arionta arbustorum,* Linn.*

† Kobelt (W.), "Beiträge zur arctischen Fauna," Jahrb. der deutschen malakozoologischen Gesellschaft, 1876, pp. 60, 165, 371.

‡ De Guerne (Jules), "Conférences faites par M. Jules de Guerne. Souvenirs d'une Mission Scientifique en Laponie," Union Géographique du Nord de France, 1882 ; and "Notes sur l'histoire naturelle des régions arctiques de l'Europe, la Varangerfjord," Bull. des Sci. de la Soc. roy. Malacol. de Belgique, vol. xviii. 1883, and xxi. 1886.

§ 'Tromsö Museums Aarshefter,' vol. v. 1882, p. 93.

* The species to which an asterisk is appended must, I think, be received with doubt. Miss Esmark does not give any locality for them, but has introduced them into the East Finmark column apparently (see p. 95) on the authority of G. O. Sars (Mollus. reg. Arct. Norveg. p. 369) ; but the column of Sars from which the names are taken does not relate to East

*Pupa muscorum*, L. Hornö at Vardö.

—— *inornata*, Mich., var. *Gredleri*, Cless., = *columella* (Bens.), Wester. Abundantly under stones on Hornö at Vardö.

—— *arctica*, Wallenb. "This species is new to Norway. Mr. Schneider found it this summer under stones together with *P. Gredleri* on Hornö at Vadsö. Wallenberg found it first in Lulea Lapmark. Müller and Mörch mention it from Greenland as *P. Hoppei*. It is found in many places in Sweden."

*Succinea putris*, Linn.*

*Limnæa stagnalis*, Linn. "At Gadde-Luobbal, Pasvik River, in Sydvaranger."

*Planorbis borealis*, Lovén. "One shell from Varanger Fiord belongs to the museum at Upsala."

*Margaritana margaritifera*, Linn. Berlevaag in East Finmark.

## CRUSTACEA.

As in the list of Mollusca, I have in the following notes inserted without locality the names of Crustacea which have been found in East Finmark by Sars and by others, but which were not met with by myself. This is therefore a complete catalogue of the Crustacea of this high northern district of Europe.

### PODOPHTHALMA.

*Hyas araneus*, Linn. Bög Fiord.

—— *coarctatus*, Leach. Varanger and Lang Fiords.

*Stenorhynchus rostratus*, Linn.

*Lithodes maia*, Linn. Vadsö.

*Eupagurus bernhardus*, Linn. Varanger Fiord.

—— *pubescens*, Kröyer. Vadsö, Lang, and Klosterelv Fiords.

*Munida rugosa*, Fabr. Vadsö (*fide* Wollebæk, 1900).

*Crangon vulgaris*, Linn. Klosterelv Fiord and Svolvær. The former is, I believe, the most north-eastern locality of our common shrimp. M. Sars recorded it in 1858 from Öxfjord.

*Pontophilus norvegicus*, M. Sars.

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but to the whole of Finmark; and why these three species have been inserted from that column, and not also *Hyalinia hammonis* and *Limnæa peregra*, there is no evidence to show. *If* a mistake has been made it has been repeated, since Westerlund, in "Land- och Söttvatten-Mollusker insamlade Vega-expeditionen" (Vega-expeditionens Vetenskapliga Iakttagelser, vol. iv. 1885, p. 148), gives a list of East Finmark Inland Mollusca which is identical with, and evidently has been taken from, the column "East Finmark" in Miss Esmark's paper.

*Sclerocrangon boreas,* Phipps. Varanger, Bög, and Klosterelv Fiords.

*Sabinæa septemcarinata,* Sabine. Vadsö, Klosterelv, and Lang Fiords.

—— *Sarsii,* S. I. Smith. One specimen, Lang Fiord.

*Spirontocaris securifrons,* Norman. Vadsö Harbour; Lang and Klosterelv Fiords.

—— *Gaimardi,* H. M.-Edw. In all the fiords.

—— *polaris,* Sabine. Varanger, Bög, and Klosterelv Fiords; Svolvær.

—— *turgida,* Kröyer. In all the Sydvaranger Fiords, Laksefiord, and Tromsö.

—— *pusiola,* Kröyer. Vadsö; Klosterelv and Lang Fiords; Svolvær.

*Pandalus borealis,* Kröyer. Varanger Fiord.

—— *Montagui,* Leach.

*Caridion Gordoni,* Bate.

*Mysis oculata,* Fabr. Klosterelv Fiord.

*Michtheimysis mixta,* Lilljeborg. Bög and Klosterelv Fiords. Considering the number and characters of the genera into which the old genus *Mysis* has now been divided, *Mysis mixta* can no longer remain in the same genus as *M. oculata.* I therefore propose a genus *Michtheimysis* to receive it. From *Mysis,* as represented by *M. oculata* and its allies, it differs in having the antennal scale unprovided with a second joint, but drawn out to an excessive length, and finally terminated in a spine-like point. In the male the sexual fourth pleopod is quite different from the same organ in *Mysis* (proper) and agrees in structure with that of *Schistomysis.*

*Erythrops Goësii,* G. O. Sars. In all the fiords.

—— *abyssorum,* G. O. Sars. Varanger Fiord, 110–150 fathoms.

*Pseudomma truncatum,* S. I. Smith.

*Amblyops abbreviata,* G. O. Sars. Taken by the Norwegian North-Atlantic Expedition east of Vadsö (Stat. 262).

*Parerythrops robusta,* S. I. Smith.

—— *abyssicola,* G. O. Sars.

*Stilomysis grandis,* Goës.

*Macromysis inermis,* Rathke. Klosterelv Fiord.

*Nyctiphanes norvegica,* M. Sars.

*Thysanoessa neglecta,* Kröyer, = *T. borealis,* G. O. Sars.

—— *longicaudata,* Kröyer, = *T. tenera,* G. O. Sars.

## CUMACEA.

*Lamprops fasciata*, G. O. Sars. Vadsö, Svolvær.

—— *fuscata*, G. O. Sars. Lang and Klosterelv Fiords.

*Hemilamprops rosea*, Norman. Lang and Bög Fiords.

—— *assimilis*, G. O. Sars.

*Leucon nasicus*, Kröyer. Lang and Klosterelv Fiords.

—— *fulvus*, G. O. Sars.

—— *acutirostris*, G. O. Sars.

*Eudorella truncatula*, Bate. Lang and Bög Fiords, only a single specimen in each locality.

—— *emarginata*, Kröyer. In all the fiords.

*Diastylis Rathkii*, Kröyer. In all the fiords.

var. *Sarsi*, nov. nom. The variety figured by Sars in 'Crustacea of Norway, Cumacea,' pl. lxx., occurred in 110–125 fathoms in the Varanger Fiord.

—— *lucifera*, Kröyer.

—— *spinulosa*, Heller.

—— *echinata*, Bate. Varanger Fiord, rare.

—— *scorpioides*, Lepechin. In all the fiords and down to 125 fathoms.

—— *Goodsiri*, Bell. Lang Fiord, in 5–30 fathoms.

*Diastylopsis resima*, Kröyer. In all the fiords, and especially abundant in a bay on the west side of Bög Fiord.

*Leptostylis macrura*, G. O. Sars.

—— *villosa*, G. O. Sars.

—— *ampullacea*, Lilljeborg.

*Pseudocuma cercaria*, J. van Ben.

*Petalosarsia declivis*, G. O. Sars.

*Campylaspis rubicunda*, Lillj. Bög Fiord.

—— *costata*, G. O. Sars.

## ISOPODA.

*Apseudes spinosus*, M. Sars.

*Sphyrapus anomalus*, G. O. Sars.

*Typhlotanais tenuicornis*, G. O. Sars. Varanger Fiord, in 110–125 fathoms.

—— *finmarchicus*, G. O. Sars. Bög Fiord.

*Leptognathia longiremis*, Lillj. Varanger and Klosterelv Fiords.

—— *brevimana*, Lillj.

*Pseudotanais forcipatus*, Lillj. Klosterelv Fiord, 3–5 fathoms.

—— *macrocheles*, G. O. Sars.

*Calathura brachiata*, Stimpson. Varanger and Bög Fiords, 100–125 fathoms.

*Gnathia elongata*, Kröyer. In all the fiords.

*Æga psora*, Linn. One specimen in Varanger Fiord.

*Limnoria lignorum*, Rathke. Klosterelv Fiord.

*Astacilla longicornis*, Sow.

*Idotea balthica*, Pallas. Vadsö and Svolvær.

—— *neglecta*, G. O. Sars. Vadsö.

*Janira maculosa*, Leach. Klosterelv and Bög Fiords.

*Jæra marina*, Linn. Vadsö, tide-marks.

*Pleurogonium rubicundum*, G. O. Sars. Vadsö.

—— *spinosissimum*, G. O. Sars.

*Munnopsis typica*, M. Sars. Varanger and Bög Fiords, in 80–120 fathoms.

*Echinozone coronata*, G. O. Sars.

*Aspidarachna clypeata*, G. O. Sars.

*Ilyarachna hirticeps*, G. O. Sars. Varanger Fiord.

*Eurycope cornuta*, G. O. Sars.

—— *producta*, G. O. Sars.

*Bopyroides hippolytes*, Kröyer.

*Phryxus abdominalis*, Kröyer.

*Dajus mysidis*, Kröyer.

## AMPHIPODA.

*Hyale Nilssoni*, Rathke.

*Opisa Eschrichti*, Kröyer.

*Socarnes Vahli*, Kröyer. Vardö (*J. S. Schneider*).

*Ambasia Danielsseni*, Boeck. Lang and Klosterelv Fiords, but only a single example in each locality.

*Aristias neglectus*, Hansen. One only, Bög Fiord, 20–30 fathoms.

—— *tumidus*, Kröyer.

*Hippomedon denticulatus*, Bate. Entrance to Vadsö Harbour.

—— *propinquus*, G. O. Sars. A few specimens in Bög Fiord and off Vadsö.

*Orchomene serratus*, Boeck. One only, Klosterelv Fiord, 2–5 fathoms.

—— *pectinatus*, G. O. Sars.

*Tryphosa grœnlandica*, Hansen.

—— *minuta*, Kröyer. Vadsö, Tromsö, and Svolvær.

*Tryphosites longipes*, Bate. Vadsö.

*Anonyx nugax*, Phipps. In all the fiords and at Tromsö and Svolvær.

*Haplonyx cicada*, Fabr. Varanger Fiord, down to 125 fathoms.

*Centromedon pumilus*, Lillj. Klosterelv Fiord, 2–5 fathoms.

*Pseudalibrotus littoralis*, Kröyer. In great abundance by washing sand dug at low water in Klosterelv Fiord and at Kirkenes.

*Onesimus Edwardsi*, Kröyer. Vadsö.

—— *plautus*, Kröyer. Recorded by Schneider from Vardö †.

**Menigrates obtusifrons*, Boeck. Svolvær.

*Euonyx chelatus*, Norman.

*Lepidepecreum umbo*, Goës. Lang Fiord, 20–30 fathoms.

*Bathyporeia pelagica*, Bate.

*Argissa hamatipes*, Norman, = *Argissa typica*, Boeck. Vadsö, 10–25 fathoms.

*Phoxocephalus Holbölli*, Kröyer. In all the fiords and at Tromsö and Svolvær.

*Paraphoxus oculatus*, G. O. Sars.

*Harpinia neglecta*, G. O. Sars. Throughout the district.

*Pontoporeia femorata*, Kröyer. In shallow water, Klosterelv and Bög Fiords.

*Ampelisca Eschrichti*, Kröyer. Varanger, Bög, and Lang Fiords, down to 125 fathoms.

—— *macrocephala*, Lillj. Throughout the district and also at Svolvær.

*Byblis Gaimardi*, Kröyer. Klosterelv, Lang, and Bög Fiords.

—— *erythrops*, G. O. Sars. Varanger Fiord.

*Haploops tubicola*, Lillj. Throughout the district.

—— *setosa*, Boeck. Varanger and Bög Fiords, to 80 fathoms.

*Stegocephalus inflatus*, Kröyer. Klosterelv Fiord, in 2–5 fathoms.

*Andaniopsis nordlandica*, Boeck. Bög Fiord, 20–30 fathoms.

*Andaniella pectinata*, G. O. Sars. One only, in the same locality as the last.

*Astyra abyssi*, Boeck.

*Amphilochus manudens*, Bate.

*Amphilochoides odontonyx*, Boeck.

*Gitanopsis inermis*, G. O. Sars.

—— *arctica*, G. O. Sars.

*Gitana Sarsi*, Boeck.

*Metopa rubrovittata*, G. O. Sars.

*Sthenometopa robusta*, G. O. Sars. Varanger Fiord, in 110–125 fathoms.

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† For this and other species entered on Schneider's authority see Schneider (J. Sparre), "Nogle zoologiske-iagttagelser fra Vardö," Tromsö Museums Aarsberetning, 1882, p. 16.

In my paper on 'British Amphipoda,' Ann. & Mag. Nat. Hist. ser. 7, vol. vi. 1900, p. 45, I instituted a genus *Metopina* to receive *M. palmata* and its allies, including *M. robusta*. *Metopina* had, however, been previously used, and I therefore here substitute the name *Sthenometopa* for my genus.

*Œdiceros saginatus*, Kröyer. One specimen, west side of entrance to Vadsö Harbour, 25 fathoms.

*Paroediceros lynceus*, M. Sars. Very common in all the fiords and at Svolvær.

—— *propinquus*, Goës, = *Œdiceros microps*, G. O. Sars. Lang Fiord, in 5–30 fathoms.

*Monoculodes tessellatus*, Schneider. In all the fiords, in 5–30 fathoms.

—— *borealis*, Boeck. Very common in all the fiords and at Svolvær.

—— *subnudus*, Norman, = *M. falcatus*, G. O. Sars. Klosterelv and Lang Fiords, 5–30 fathoms.

—— *latimanus*, Goës. Lang and Bög Fiords, 5–30 fathoms.

—— *longirostris*, Goës. Lang and Bög Fiords, 5–50 fathoms.

—— *Packardi*, Boeck. Varanger Fiord, 100–125 fathoms.

—— *norvegicus*, Boeck.

—— *tuberculatus*, Boeck.

*Monoculopsis longicornis*, Boeck. Vadsö and Bög Fiord, 20–30 fathoms.

*Perioculodes longimanus*, Bate. Lang and Bög Fiords, 3–30 fathoms, and at Svolvær.

*Halimedon brevicalcar*, Goës. Bög Fiord, shallow water, and Svolvær.

—— *parvimanus*, Bate & Westw.

—— *megalops*, G. O. Sars.

*Bathymedon obtusifrons*, Hansen. Varanger and Bög Fiords, 50–125 fathoms.

*Pontocrates arcticus*, G. O. Sars.

*Aceros phyllonyx*, M. Sars. In all the fiords, 5–125 fathoms.

*Aceroides latipes*, G. O. Sars, = *Aceros distinguendus*, Hansen. One specimen, Varanger Fiord, 125 fathoms.

*Pleustes panoplus*, Kröyer. Vadsö and Svolvær.

*Paramphithoe bicuspis*, Kröyer. Vardö, *fide* Schneider.

—— *pulchella*, Kröyer. Varanger and Lang Fiords, 3–30 fathoms.

—— *brevicornis*, G. O. Sars.

*Parapleustes latipes*, M. Sars. Lang Fiord, 5–15 fathoms.

*Parapleustes glaber*, Boeck. Tromsö and Svolvær. Sars says that it is found "off the whole coast of Finmark."

—— *pulchellus*, G. O. Sars.

*Acanthozone cuspidata*, Lepechin.

*Acanthonotosoma serratum*, Fabr. Bög Fiord, 20–30 fathoms.

*—— *cristatum*, Owen. Svolvær.

*Odius carinatus*, Bate. Bög Fiord, 20–30 fathoms.

*Syrrhoe crenulata*, Goës. In all the fiords, 5–125 fathoms.

*Tiron acanthurus*, Lillj., = *Tessarops hastata*, Norman. Lang Fiord, 20–30 fathoms.

*Pardalisca cuspidata*, Kröyer. Klosterelv and Bög Fiords, in 5–10 fathoms.

*Halice abyssi*, Boeck.

*Eusirus cuspidatus*, Kröyer.

*Rhachotropis Helleri*, Boeck. One specimen, in the Varanger Fiord.

—— *inflata*, G. O. Sars, = *R. tumidus*, G. O. Sars. (Crust. Norway, Amphip. p. 430). Klosterelv Fiord, 3–5 fathoms.

—— *macropus*, G. O. Sars.

*Halirages fulvocincta*, M. Sars. Vadsö and Bög Fiord, 10–20 fathoms.

**Apherusa bispinosa*, Bate. Svolvær.

—— *tridentata*, Bruz.

—— *megalops*, G. O. Sars.

*Calliopius læviusculus*, Kröyer. Tide-marks, Vadsö.

**Paratylus uncinatus*, G. O. Sars. Svolvær, one specimen.

—— *Swammerdamii*, H. M.-Edw.

—— *Smitti*, Goës.

*Dexamine spinosa*, Mont. Svolvær. Dr. Danielssen found it at Vadsö.

—— *thea*, Boeck. Abundant, tide-marks, Vadsö.

*Melphidippa borealis*, Boeck.

*Amathilla homari*, Fabr. Vadsö and Bög Fiord, tide-marks and dredged in shallow water, also at Svolvær.

*Gammarus locusta*, Linn. Tide-marks throughout the district.

*Melita Goësi*, Hansen ('Oversigt over de paa Dijmphna-Togtet insamlade Krebsdyr,' 1886, p. 46, pl. xxi. fig. 13). A fine and quite perfect specimen, taken in Lang Fiord, in 20–30 fathoms. This species is at once distinguished from *Melita dentata* by the long, narrow, parallel-sided, basal joints of the last three pairs of peræopods and the less spinous armature of the mesosoma. New to the Norwegian fauna. Previously known from the Kara Sea and (?) Spitsbergen; and dredged by Mr. Whiteaves in the Gulf of St. Lawrence.

**Cheirocratus assimilis*, Lillj. Svolvær.

*Lilljeborgia pallida*, Bate. Lang and Klosterelv Fiords, in 5–25 fathoms.

—— *fissicornis*, M. Sars. One only, Bög Fiord, 20–30 fathoms.

*Idunella æquicornis*, G. O. Sars. Varanger Fiord, 100–125 fathoms.

*Microdeutopus* sp. A small female, too young to assign with certainty to a species.

*Protomedeia fasciata*, Kröyer. Abundant in all the fiords of Sydvaranger; also at Svolvær.

*Gammaropsis melanops*, G. O. Sars. Varanger Fiord.

*Photis tenuicornis*, G. O. Sars. Vadsö, in 10–25 fathoms.

—— *Reinhardi*, Kröyer.

*Amphithoe rubricata*, Mont. Vadsö and Svolvær.

*Ischyrocerus anguipes*, Kröyer. Vadsö, tide-marks.

*—— *megalops*, G. O. Sars. Svolvær.

—— *minutus*, Lillj. Vadsö.

*Parajassa pelagica*, Leach, = *Podocerus capillatus*, Rathke. Vadsö, tide-marks.

*Corophium crassicorne*, Bruz. Vadsö and Lang Fiord, Tromsö, Svolvær.

—— *affine*, Bruz. Vadsö, Klosterelv and Bög Fiords.

*Unciola leucopis*, Kröyer. Varanger Fiord, 120–150 fathoms.

—— *planipes*, Norman.

*Dulichia curticauda*, Boeck. Klosterelv Fiord, 2–5 fathoms.

—— *porrecta*, Bate. Klosterelv Fiord, 2–5 fathoms.

—— *spinosissima*, Kröyer.

—— *monacantha*, Metzger.

—— *falcata*, Bate.

*Phtisica marina*, Slabber.

*Caprella linearis*, Linn. One male, Varanger Fiord.

—— *septentrionalis*, Kröyer. Varanger Fiord, Tromsö.

*Paracyamus boopis*, Lütken.

## PHYLLOCARIDA.

*Nebalia bipes*, Fabr. Vadsö.

## PHYLLOPODA.

The following three Phyllopoda and two of the Cladocera have been found by Sars in East Finmark:—

*Branchinecta paludosa*, O. F. Müll.

*Polyartemia forcipata*, S. Fischer.

*Limnetis brachyurus*, O. F. Müll.

## CLADOCERA.

*Holopedium gibberum*, Zaddach. Sydvaranger.
*Daphnia magna*, Strauss.
*Cephaloxus cristatus*, G. O. Sars. Kirchenes.
**Ceriodaphnia quadrangula*, O. F. Müll. Hammerfest.
*Bosmina obtusirostris*, G. O. Sars. Sydvaranger and Hammerfest.
*Macrothrix arctica*, G. O. Sars.
*Acantholeberis curvirostris*, O. F. Müll. Sydvaranger.
*Ophryoxus gracilis*, G. O. Sars. Vardö and Sydvaranger.
*Alonopsis elongata*, G. O. Sars. Sydvaranger, also Hammerfest.
*Acroperus harpæ*, Baird. Sydvaranger.
*Alonella excisa*, S. Fischer. Sydvaranger.
—— *nana*, Baird. Sydvaranger.
**Chydorus sphæricus*, O. F. Müll. Hammerfest.
*Polyphemus pediculus*, Linné. Sydvaranger, also Hammerfest.
**Bythotrephes Cederströmii*, Schœdler. Tromsö.

## OSTRACODA.

In the Annals & Mag. Nat. Hist. ser. 6, vol. vii. (1891) p. 108, I published "Notes on the Marine Crustacea Ostracoda of Norway," among which were included the species I had obtained in East Finmark in 1890. Referring to that paper for an account of exact localities &c., I give here a list of the Ostracoda obtained, in order to make this enumeration of the Crustacea of East Finmark complete.

*Pontocypris trigonella*, G. O. Sars.
*Argillæcia cylindrica*, G. O. Sars.
*Cythere lutea*, Müller.
—— *pellucida*, Baird.
—— *confusa*, Brady & Norman.
—— *gibbosa*, Brady & Robertson.
—— *limicola*, Norman.
—— *cluthæ*, Brady, Crosskey, & Robertson.
—— *villosa*, G. O. Sars.
—— *tuberculata*, G. O. Sars.
—— *concinna*, R. Jones.
—— *emarginata*, G. O. Sars.
—— *finmarchica*, G. O. Sars.
—— *angulata*, G. O. Sars.
—— *mirabilis*, G. S. Brady.
—— *dunelmensis*, Norman.
*Cytheridea papillosa*, R. Jones.
—— *punctillata*, G. S. Brady.
*Cytheridea Sorbyana*, R. Jones.
*Eucythere declivis*, Norman.
—— ——, var. *argus*, G. O. Sars.
*Krithe bartonensis*, R. Jones.
*Loxoconcha tamarindus*, R. Jones.
—— *fragilis*, G. O. Sars.
*Xestoleberis depressa*, G. O. Sars.
*Cytherura affinis*, G. O. Sars.
—— *sella*, G. O. Sars.
—— *undata*, G. O. Sars.
—— *grœnlandica*, Brady & Norman.
—— *similis*, G. O. Sars.
—— *nigrescens*, Baird.
—— *rudis*, G. S. Brady.
—— *cellulosa*, Norman.
*Cytheropteron latissimum*, Norman.

*Cytheropteron nodosum*, G. S. Brady.
*Bythocythere constricta*, G. O. Sars.
—— *recta*, G. S. Brady.
*Pseudocythere caudata*, G. O. Sars.
*Sclerochilus contortus*, Norman.
*Paradoxostoma variabile*, Baird.
—— *rostratum*, G. O. Sars.
—— *inflexum*, Brady & Norman.
*Polycope orbicularis*, G. O. Sars.
*Philomedes brenda*, Baird.

The six following species were additions to the Norwegian fauna :—

*Cythere cluthæ.*
—— *mirabilis.*
*Cytherura grœnlandica.*
*Cytherura rudis.*
*Bythocythere recta.*
*Paradoxostoma inflexum.*

Professor G. O. Sars has recorded the following additional species from East Finmark :—

*Herpetocypris glacialis*, G. O. Sars.

The following East Finmark Crustacea have as yet not been found elsewhere :—

*Typhlotanais finmarchica.*
*Pseudotanais Lilljeborgii.*
*Gitanopsis inermis.*
—— *arctica.*
*Apherusa megalops.*
*Paradoxostoma rostratum.*
—— *inflexum.*

Arctic species not known to occur further south than East Finmark :—

*Pseudomma truncatum.*
*Mysis oculata.*
*Dyastylis spinulosa.*
*Calathura brachiata.*
*Dajus mysidis.*
*Opisa Eschrichtii.*
*Aristias tumidus.*
*Œdiceros borealis.*
—— *saginatus.*
*Monoculodes longimanus.*
*Aceroides latipes.*
*Parapleustes pulchellus.*
*Paratylus Smitti.*
*Mæra Goësii.*
*Idunella æquicornis.*
*Unciola leucopis.*
*Paracyamus boopis* (?).
*Cytherura grœnlandica.*
—— *rudis.*
*Herpetocypris glacialis.*

Species which are not as yet known to occur under more arctic conditions than those of East Finmark :—

*Stenorhynchus rostratus.*
*Crangon vulgaris.*
*Spirontocaris securifrons.*
*Caridion Gordoni.*
*Parerythrops abyssicola.*
*Mysideis insignis.*
*Macromysis inermis.*
*Lamprops fasciata.*
*Hemilamprops rosea.*
—— *assimilis.*
*Leucon acutirostris.*
*Eudorella truncatula.*
*Leptostylis villosa.*
—— *ampullacea.*
*Pseudocuma cercaria.*
*Campylaspis costata.*

*Apseudes spinosus.*
*Leptognathia brevimana.*
*Pseudotanais macrocheles.*
*Limnoria lignorum.*
*Idotea baltica.*
—— *neglecta.*
*Astacilla longicornis.*
*Pleurogonium rubicundum.*
—— *spinosissimum.*
*Echinozone coronata.*
*Aspidarachna clypeata.*
*Pseudarachna hirsuta.*
*Eurycope cornuta.*
—— *producta.*
*Hyale Nilssoni.*
*Ambasia Danielsseni.*
*Hippomedon denticulatus.*
—— *propinquus.*
*Tryphosites longipes.*
*Euonyx chelatus.*
*Harpinia neglecta.*
*Byblis erythrops.*
*Andaniopsis nordlandica.*
*Astyra abyssi.*
*Gitana Sarsii.*
*Metopa rubrovittata.*
*Sthenometopa robusta.*
*Monoculodes tessellatus.*
—— *norvegicus.*
—— *subnudus.*
*Monoculodes Packardi.*
*Perioculodes longimanus.*
*Halimedon parvimanus.*
*Paramphithoe brevicornis.*
*Parapleustes latipes.*
*Halice abyssi.*
*Rhachotropis Helleri* (?).
*Apherusa tridentata.*
*Paratylus Swammerdamii.*
*Dexamine spinosa.*
—— *thea.*
*Melphidippa borealis.*
*Lilljeborgia pallida.*
*Parajassa pelagica.*
*Corophium affine.*
*Dulichia monacantha.*
—— *falcata.*
*Phtisica marina.*
*Pontocypris trigonella.*
*Argillœcia cylindrica.*
*Cythere pellucida.*
*Loxoconcha fragilis.*
*Cytherura affinis.*
—— *sella.*
—— *similis.*
—— *nigrescens.*
—— *cellulosa.*
*Cytheropteron nodosum.*
*Bythocythere recta.*
*Polycope orbicularis.*

Future investigations will undoubtedly greatly modify these lists, and also, though in a very much less degree, the division of the Mollusca into Arctic and Boreal species.

North and south are not in these papers so much regarded as affecting distribution as the more or less arctic conditions. Thus from a distributional point of view the North Cape, although really north of the greater part of East Finmark, may be regarded zoologically as to the south, since all boreal species must pass round the North Cape to reach East Finmark, and are also at the North Cape living under less arctic conditions. On the other hand, all South Greenland, Iceland, and the Murman coast may zoologically be considered to be more northern, since their climate is more arctic.

[To be continued.]

## LXV.—*On Five new Mammals from Arabia and Persia.*
### By OLDFIELD THOMAS.

THROUGH the instrumentality of my colleague Mr. W. R. Ogilvie-Grant, Mr. G. W. Bury has been making a collection of mammals and birds in the high country to the north of Aden, on the borders of Yemen. Among the specimens so obtained are three genets (the genus *Genetta* not having been previously recorded from Arabia), a new *Meriones*, and examples of the Arabian fox, which I now think should have a special subspecific name. While working these out I have taken the opportunity to describe another fox from Northern Persia and a mouse obtained in Central Persia by Mr. Witherby.

### *Genetta Grantii*, sp. n.

A member of the *G. dongolana* group and very similar to the red-spotted East-African species (*G. suahelica*, Matsch.). Centre line of back from behind withers to tail with a narrow black line; all other body-markings reddish fulvous. Head grey, with a well-defined dark median line, bordered on each side with a broader white streak. Nape with seven narrow dark lines, all of about equal breadth, diverging as they run backwards as usual. Sides each with five lines of spots, the upper line irregularly united into a more or less continuous streak. Under surface dull greyish, not so buffy as in *G. suahelica.* Ears grey, without darker spots at their posterior base. Forearms grizzled greyish, almost without spots, scarcely darker behind; fore feet greyish white, the outer edge of the metacarpal blackened below. Hind limbs indistinctly spotted above, the usual black patch above the ankle inconspicuous. Tail long-haired and shaggy, the rings not sharply marked, owing to the overlapping of the hairs; indeed they are scarcely definable proximally; dark rings eleven or twelve in number, each rather shorter than the light ones dividing them; light rings washed with dull fulvous above.

Dimensions of the type (measured in the flesh):—

Head and body 414 millim.; tail 426; hind foot 78; ear 32.

Skull: basal length 75; zygomatic breadth 39; palate length 38.

*Hab.* Azraki Ravine, Haushabi, Southern Arabia. Alt. 5200 feet.

*Type.* Male. Original number 7. Collected 30th May, 1902, by G. W. Bury. Three specimens.

### *Meriones Buryi*, sp. n.

A tufted-tailed *Meriones*, with naked feet, superficially resembling *Gerbillus persicus*, Blanf.

Size fairly large. General characters of *Meriones*, but with wholly naked soles, which are apparently, as in "*Gerbillus*" *persicus*, granulated and quadrituberculate. General colour above deep "clay-colour," strongly grizzled with black; sides clearer fawn; belly dull buffy white, some of the hairs slaty based, others white to their roots; lips and chin white; chest with an ill-defined drabby patch. Median line of head like back; cheeks and ocular area grizzled grey; ears of medium length, their substance dark, their few fine hairs drabby fawn. Rump with a number of longer whitish-tipped hairs intermixed with the fur. Upper surface of hands and feet pale fawn. Tail long, dark fawn all round proximally, heavily black-crested above for its terminal half, the longest hairs attaining 15–18 millim.

Skull stout and less strongly built; supraorbital region heavily ridged; palatal foramina long, reaching just to the level of the front of $m^1$; bullæ not excessively swollen.

Dimensions of the type (measured in the flesh):—

Head and body 148 millim.; tail 168; hind foot (s. u.) 33; ear 21.

Skull: basilar length 32·5; zygomatic breadth 21·7; interorbital breadth 6·6; palate length 19; diastema 11; palatal foramina 7·7; length of bullæ 12; length of upper molar series (crowns) 5·6.

*Hab.* Zal êd, Haushabi, in the hills north of Aden; altitude 4300 feet.

*Type.* Female. Collected 13th September, 1902, by Mr. G. W. Bury, after whom the species is named. Three specimens examined.

Owing to the fact that worn molars of *Meriones* are quite indistinguishable from those of *Gerbillus*, *Dipodillus*, &c., and that this species has the Dipodilline character of wholly naked soles, *Meriones Buryi* might easily be taken for a member of the latter group, in which it would stand near "*Gerbillus*" *persicus*, whose proportions and foot-characters are not dissimilar. Unfortunately no young specimens, showing the true molar structure, of either *G. persicus* or *M. Buryi* are available, and until that is the case I shall not feel satisfied about the proper allocation of either form. But in general skull-structure *M. Buryi* resembles some of the most typical species of *Meriones*, and I therefore now refer it to that genus, within which it may be readily distinguished by the characters above given.

"*Gerbillus*" *calurus* is another species of doubtful position, and it appears probable that the examination of young specimens will show it to be also a *Meriones*.

### *Vulpes vulpes arabica*, subsp. n.

Allied to the Egyptian fox (*V. v. ægyptiaca*), but smaller and differently coloured.

Size intermediate between *V. vulpes* and *V. leucopus*. General tone of dorsal area rich tawny ochraceous, the hairs being not or rarely grizzled with grey. In the Egyptian fox the back is profusely grizzled and the general tone is much deader and browner. Face, and especially crown, bright fulvous, often conspicuous in specimens whose bodies are in the brown, out-of-season, pelage. Ear-backs rarely deep black, more often greyish, and sometimes scarcely darker than the head. The usual light patches in front of and behind the shoulders dull yellowish. Chin and belly dull whitish; chest with a variable amount of black upon it. Tail of medium thickness, dull greyish fulvous, its tip generally inconspicuously white. Skull shorter, broader, and rather more depressed than in the Egyptian fox.

Dimensions of the type (measured in skin):—

Head and body 610 millim.; tail 320; hind foot 130; ear 98.

Skull: basal length 120; greatest breadth 68; interorbital breadth 24·3; breadth of brain-case 43·6; palate, length 64, breadth between outer sides of $p^4$ 38; outer length of $p^4$ 11·8; greatest diameter of $m^1$ 11·7, of $m^2$ 8·6; combined antero-posterior diameter of the two latter teeth 12·7.

*Hab.* (of type). Muscat. Other specimens from Aden and the Hadramaut.

*Type.* Adult female. B.M. no. 94. 3. 9. 1. Collected and presented by Surg.-Gen. A. S. G. Jayakar.

On account of its more vivid colour the Arabian fox seems to deserve a subspecific name, though its considerable variability makes it somewhat difficult to describe. Of previously named forms Gray's "*V. flavescens*," said to be from Persia, is a much paler and longer furred animal. Blanford's *V. persica* is probably synonymous with *V. flavescens*, but the type is in such bad pelage that the point cannot be settled at present.

### *Vulpes vulpes splendens*, subsp. n.

A large long-haired fox of a vivid fulvous colour.

Size large, skull equal to that of the largest Siberian foxes. General colour above all over rich bright tawny ochraceous, grizzled with white on the posterior half of the back. This rich colour is not confined to a narrow dorsal area, but extends over the whole upper surface, crown, nape, back, and sides. Individually the hairs are brownish basally, rich ochraceous terminally, with a whitish subterminal band in the posterior dorsal ring. Muzzle reddish brown. Backs of ears orange-fulvous at their anterior bases, deep black terminally. Belly and proximal part of limbs a rich deep reddish, between "hazel" and "ochraceous-rufous" of Ridgway; lips and chin greyish; chest white, with brown bases to the hairs. Hands and feet very thickly furred, grizzled black above, red on the sides and, more dully, below. Tail very large and thick, forming a fine brush of a fulvous nearly as vivid as that of the body; some of the hairs black-tipped and all with greyish bases; a distinct white tip to the tail.

Skull stout and heavy, with a large rounded brain-case; decidedly larger than in the southern Persian and Arabian forms—more as in Siberian examples. Frontal region more or less convex, less markedly flattened than usual. Interorbital and intertemporal region broad.

Dimensions of the type (measured in skin):—

Head and body 780 millim.; tail 490; hind foot 162; ear 93.

Skull: basal length 132; zygomatic breadth 77; interorbital breadth 29; intertemporal breadth 26·5; breadth of brain-case 48; palate length 70; length of $p^4$ (outside) 14; greatest diameter of $m^1$ 13·3, of $m^2$ 8, combined length of two latter teeth 15.

*Hab.* Astrabad, N. Persia.

*Type.* B.M. no. 83. 2. 10. 1. Collected by Lieut.-Col. Beresford-Lovett.

This magnificent fox exceeds in the richness of its coloration any Old-World form with which I am acquainted. Not only is the fulvous of its upper surface far brighter than in other races, but the deep rich rufous of its belly distinguishes it from all its allies. Still it is no doubt only a local race of the common fox, and would grade westwards into *V. vulpes*, southwards into *V. v. flavescens*, and eastwards into *V. v. montana*.

## *Mus sylvaticus Witherbyi*, subsp. n.

A mouse of the *M. sylvaticus* group, with pure white belly and very small teeth.

Size as in small forms of *M. sylvaticus*. General colour pale grey, but cheeks and sides clear fulvous, which is no doubt the colour of the whole upper surface when in fully adult pelage. Under surface, from lips and chin to anus, inner sides of limbs, and whole of hands and feet pure snowy white, the hairs white to their roots, except just on the chest, where they have slaty bases. Ears of medium length, grey. Tail longer than the head and body, sharply bicolor, blackish above, pure white below.

Skull as compared with that of *M. s. arianus*, Blanf., rather smaller, and with decidedly smaller teeth.

Dimensions of the type (measured in the flesh):—

Head and body 93 millim.; tail 102; hind foot 21; ear 16.

Skull: greatest length 25·5; basilar length 19·6; interorbital breadth 3·8; palate length 11; palatal foramina 4·8; length of upper molar series 3·2.

*Hab.* Near Sheoul, Fars, Persia. Altitude 5200 feet.

*Type.* Male, young adult. B.M. no. 2. 10. 1. 14. Collected 15th May, 1902, and presented by Harry F. Witherby, Esq.

This is evidently a desert form of the *Mus sylvaticus* group, its snowy-white belly distinguishing it from every described race. Its nearest geographical ally, *M. s. arianus*, Blanf., from Kohrud, N. of Isfahan, has also markedly larger teeth.

I have named this pretty mouse in honour of Mr. Witherby, to whom the National Museum owes examples of several interesting Persian mammals.

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## LXVI.—*Two new Australian Small Mammals.*

By Oldfield Thomas.

### *Mus ferculinus*, sp. n.

An insular form of the West-Australian *M. nanus*, Gould.

Size about as in *M. nanus*. General colour pale greyish brown, paler than in *M. nanus*; head darker brown than the back. Ears rather short, laid forward in a spirit-specimen they only just reach to the posterior canthus of the eye. Upper surface of hands and feet dull greyish white; fifth hind toe short, reaching without claw barely to the base of the fourth; external metatarsal pad of soles almost or quite obsolete; internal metatarsal oval. Tail rather shorter than the head and body, very finely scaled (14–15 rings to the centimetre), finely haired, brown above, dull white below.

Skull about as in *M. nanus*.

Dimensions of the type (measured on the spirit-specimen):—

Head and body 96 millim.; tail 93; hind foot (s. u.) 23 7; ear 12·5.

Skull: greatest length 27; basilar length 20·6; zygomatic breadth 14·5; nasal length 9·7; interorbital breadth 4; palatal foramina 5·6; diastema 6·4; length of upper molar series 5·2.

An older specimen has a head and body length of 103 millim.; tail 93; hind foot 24.

*Hab.* Barrow Island, N.W. Australia.

*Type.* Young adult female. B.M. no. 2. 10. 10. 7. Collected by Mr. Tunney, and presented by the Perth Museum, Western Australia. Five specimens examined.

I owe to the kindness of Mr. B. H. Woodward, Curator of the Perth Museum, the opportunity of describing this Barrow Island rat, which appears to be a pale insular form of Gould's *Mus nanus.*

### *Sminthopsis crassicaudata centralis*, subsp. n.

A pale desert form of *S. crassicaudata.*

General colour pale "isabella," finely grizzled with brown, clearing on sides to "cream-buff," sharply defined from the snowy white of the underside, where, however, the hairs are as usual all slaty based. Muzzle and sides of face dull creamy white; median frontal and nuchal area darker, edged on each side, round the bases of the ears, with buffy; a white spot behind the posterior base of each ear. Hands and feet pure white. Fine hairs of ears and tail white, the greyish skin showing through. Tail apparently rather longer than in typical *crassicaudata.*

Dimensions of the type (measured in the flesh):—

Head and body 79 millim.; tail 63; hind foot (s. u.) 15·5; ear 22.

Skull: basal length 23; combined length of three anterior molariform teeth 4·7.

*Hab.* Killalpanima, Lake Eyre East, desert region of South Australia.

*Type.* Male. B.M. no. 2. 9. 8. 7. Collected 21st June, 1902, and presented by H. J. Hillier, Esq.

Native name in Diari language "chooda-chooda."

This is the central desert representative of *S. crassicaudata*, and shows the usual desert pallor. Its tail, as already pointed out by Prof. Spencer[*], is rather longer than in ordinary coast specimens.

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[*] Horn Exp. ii. p. 31 (1896).

## LXVII.—*On Azara's "Chauve-souris onzième"* (Myotis ruber, *Geoff.*) *and a new Species allied to it.* By OLDFIELD THOMAS.

WHEN giving an account of Mr. W. Foster's Paraguayan bats* I was not able definitely to determine Azara's "Chauve-souris onzième" (*Myotis ruber*, Geoff.), but suggested that a certain fawn-coloured species already known to me from Argentina might prove to represent it.

Mr. Foster has now sent to us three specimens of a *Myotis* which, on grounds both of locality and the exactitude of its agreement with Azara's description, I have no hesitation in identifying with his species.

This bat, which must bear the name of *Myotis ruber* †, Geoff., is a fairly large animal (forearm 40 millim.), with rather short velvety fur and medium-sized ears deeply excavated on their outer margin. In colour it is uniform rufous-brown above ("Mars brown"), the hairs scarcely or not darker towards their roots, and rather paler below, the posterior belly and anal region gradually becoming strong ochraceous yellow, just as in the same part of its body *M. albescens* becomes conspicuously white.

The skull is large and heavy for the group, with particularly stout powerful canines, which are conspicuously visible in an upper view of the skull.

From this bat the Argentine one formerly referred with doubt to *M. ruber* is clearly distinct, and there being apparently no other name available, it may be called

### *Myotis Dinellii*, sp. n.

Size less than in *M. ruber*, the difference being most marked in the skull.

Fur comparatively long (hairs on back about 7–7·5 millim. in length), wavy as in most species, not velvety. Hairs extending but little on to interfemoral above, and not at all below; no interfemoral fringe. General colour above uniform dull rufous-cinnamon, the basal halves of the hairs slaty black; under surface dull "isabella," mixed with the slaty bases of the hairs. Membranes uniformly dark, without whiter edging, but the lines on the under surface of the interfemoral white.

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* Ann. & Mag. Nat. Hist. (7) viii. p. 443 (1901).

† D'Orbigny's correct reference to this bat under the name of "*Vespertilio ruber*" is misquoted by Lataste (Act. Soc. Sci. Chili, i. p. 79, 1892) and Trouessart (Mamm. p. 131, 1899) as *V. rufus.*

Ears fairly long, their anterior edge evenly convex, their posterior deeply emarginate.

Skull and teeth of normal proportions, the canines scarcely visible from above. Small upper premolars subequal in transverse area, the posterior about half the height of the anterior, very slightly drawn inwards, and clearly visible from without.

Dimensions of the type:—

Forearm 39 millim.

Head and body 44; tail 41; ear 14; third metacarpal 35; lower leg 17; hind foot (s. u.) 7·5.

Skull: front of canine to back of $m^3$ 5·5; greatest length (in another specimen) 14·5.

*Hab.* Tucuman. Other specimens from Salta (*Spegazzini*) and Bolivia (*Simons*).

*Type.* Female. B.M. no. 0. 7. 9. 4. Collected 7th April, 1899, by L. Dinelli; presented by Oldfield Thomas. Five specimens examined from the type locality.

It would thus appear that in Paraguay and the neighbouring parts of Argentina four species of *Myotis* are to be found, distinguishable as follows:—

| | |
|---|---|
| General colour dark greyish or blackish. | |
| Lower belly not whiter. No naked patch between shoulders .................... | *M. nigricans*, Wied. |
| Lower belly passing into white. A naked patch between shoulders.............. | *M. albescens*, Geoff. |
| General colour more or less rufous or fawn. | |
| Lower belly passing into yellow. Dorsal fur short, reddish throughout ............ | *M. ruber*, Geoff. |
| Lower belly not yellow. Dorsal fur long, dark at base ........................ | *M. Dinellii*, Thos. |

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## LXVIII.—*Description of a new Snake of the Genus* Pseudechis *from Queensland.* By G. A. Boulenger, F.R.S.

### *Pseudechis Colletti.*

Eye rather small, its diameter nearly equalling its distance from the mouth. Rostral as deep as broad? (end of snout damaged in the single specimen); frontal small, once and a half as long as broad, not longer than the præfrontals, much narrower than the supraoculars, half as long as the parietals;

posterior nasal in contact with the single præocular; two postoculars; temporals 2+2, first lower very large and wedged in between the fifth and sixth labials; six upper labials, third and fourth entering the eye, third, fourth, and fifth equal in depth. Scales in 25 rows on the neck, in 19 on the body. Ventrals 223; anal divided; subcaudals 60, mostly single, only the 9 last divided. Dark brown above, with irregular yellowish blotches; a yellowish vertebral streak on the nape; sides and lower parts yellowish.

Total length 450 millim.; tail 65.

A young specimen from Queensland, locality unknown, for which I am indebted to my friend Prof. R. Collett.

This species differs from *P. papuanus*, Ptrs. & Dor., to which it is most nearly related, in the narrower frontal shield, the equal depth of the third, fourth, and fifth labials, and the small number of divided subcaudals.

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## LXIX.—*New Eastern Heterocera.*

By Colonel C. SWINHOE, M.A., F.L.S., &c.

### Family Agaristidæ.

### *Eusemia solicita*, nov.

♂. Antennæ, palpi, head, thorax, and fore wings black, palpi with a white band on first and third joints; face with a white spot on each side in front, a white spot between the antennæ, and four white spots on the front of thorax; abdomen ochreous yellow, with black segmental bands, which are broadest above: fore wings with two ochreous-white transverse bands—the first from the subcostal vein across the middle of the cell, extending downwards nearly to vein 1, the second across the disk from near the costa one third from apex to near outer margin above the hinder angle; also from two to four subapical white dots; in the nine examples before me these bands vary more or less, some being nearly even and some sinuated: the hind wing is reddish orange, with black basal, costal, and outer marginal bands, the outer band attenuated towards the anal angle and its inner margin sinuous; in the middle of the costa there is a knob-shaped production inwards; a short thick black band from the abdominal margin, above the angle, connected by two black lines with the marginal band, two white dots on the apical portion of the marginal black band, sometimes three, sometimes none at all.

Expanse of wings 2½ inches.

Kina Balu (*Waterstradt*), Sandakan.

There is in the B. M. one example from Sarawak and two without locality with *E. vetula*, Hübner, and one from Sarawak and another marked Borneo with *E. conspicua*, Rothschild: it is allied to the latter, but is, I am convinced, quite distinct; it is much smaller and the inner band on fore wings is in quite a different position.

## Family **Lymantriidæ**.

### *Euproctis oreosaura.*

*Adlullia oreosaura*, Swinh. Ann. & Mag. Nat. Hist. (6) xiv. p. 435 (1894).

Type ♀, Cherra Punji, in B. M.

I have now received a male of this rare and handsome moth: the fore wings are coloured and marked as in the female; the hind wings are much whiter, slightly tinged with yellow in the costal and outer marginal spaces, the interior pale red-brown.

Expanse of wings $2\frac{1}{10}$ inches.

I have also received a pair from Malang, Java.

## Family **Euteliidæ**.

### *Targalla apicifascia.*

*Eutelia apicifascia*, Hmpsn. Moths India, ii. p. 394 (1894).

Type ♀, Bombay, in B. M.

I have both sexes from Port Blair, Andaman Islands (*Hamilton*), and from Goping, Perak (*Kunstler*). It belongs to Hampson's Section I., and not Section III., the antennæ of the male being simple and not bipectinate.

## Family **Quadrifidæ**.

### *Sypna fenella*, nov.

♂ ♀. Head, body, and fore wings dark pink-brown, tinged with ochreous; costa of fore wings with three duplex pale spots — subbasal, antemedial, and medial — indicating the commencement of three duplex, transverse, ochreous, very indistinct bands; a straight ochreous thin band across the disk, connected with the outer margin above the middle by a broad dull ochreous patch; a rather prominent ochreous spot at end of cell; submarginal black spots each containing duplex ochreous points; marginal pale line and black cilia with dull ochreous spaces at the vein ends; two pairs of white dots on the costa towards the apex: hind wings brown; an indistinct ochreous central band, a short similar band running up from the anal angle, a large ochreous space occupying the apical half of the outer margin. Underside ochreous, with brown transverse bands somewhat similar to those in *S. diversipennis*, Walker, but the central band of fore wings is more curved, the inner and outer bands broader and darker, as is also the outer band of hind wings.

Expanse of wings $2\frac{3}{10}$ inches.

Kina Balu, N. Borneo (*Waterstradt*).

Allied to nothing I know of.

### *Ischyja Anna*, nov.

♂. Eyes deep black; palpi brown, sprinkled with white scales and with the first two joints pure white beneath; body and wings brown, with a bronzy tint, and irrorated with minute grey atoms: fore wings with the orbicular and reniform shaped much as in *I. manlia*, but indistinct and not prominent as in that species; the deep black bars entirely wanting; a straight duplex line with pale centre from costa one fourth from apex to hinder margin one third from the angle, the inner side of this line broadly black; between this line and the base and below the cell is a brown triangle filling up nearly the whole space, its outer side parallel with the discal line: the hind wing has a broad, discal, blue-grey, short band much as in *manlia*, with the outer portions blackish, and similar anal spot. The underside is dull pale brown; fore wings with an upper discal short whitish band much as in *manlia*; the hind wings white, with a blue tinge, a broad marginal band, and a brown sinuous medial line.

Expanse of wings 3 inches.

Kina Balu, N. Borneo (*Waterstradt*).

Allied to *I. Hageni*, Snellen, from Sumatra (Tijd. v. Ent. xxviii. p. 7, pl. i. fig. 3, 1885), but this species has a large brown ring with irregular sides on the inner disk of fore wings above, and not a triangle as in *Anna*; the white on the hind wings below has a band of spots across it and the palpi are not white beneath.

### *Ischyja recta*, nov.

♂. Like *A. Anna*; also with the palpi pure white beneath, as in *Anna*, but the mark in the interior disk of fore wings is shaped differently to any other species in the genus, being very nearly square, with the lower side formed by the hinder margin.

Expanse of wings 3 inches.

Singapore, Sandakan. Type in B. M.

### *Ischyja ebusa*, nov.

♀. Palpi, head, body, and more than the inner half of fore wings purple-black: fore wings with the orbicular and reniform as in *I. manlia* ♀, the black portion of the wing limited by a straight pale thin band with black outer edges; outer portion of wing brown, thickly irrorated with white atoms, except in a small portion of the wing, where the absence of irroration leaves a black apex and black waved band below it; outer margin with pure white points: hind wings blackish brown; a very large central white patch, nearly round, and below it there are white irrorations to the outer margin near the anal angle. Underside blackish brown, the white central bands as in *manlia*, but much broader; a white suffused space inside the band of fore wings.

Expanse of wings $4\frac{4}{10}$ inches.

Solomon Islands (*Ribbe*).

Allied to *I. neocherina*, Butler, from New Britain. It is such a handsome distinct species, though a female only is in my possession, I am tempted to describe and name it.

### *Ischyja inferna*, ♂.

Above as in *I. manlia*, Cram.; the blue band in the hind wings is not contracted in its middle as in that species and is attenuated hindwards, but otherwise it is very similar; the underside, however, is very different, the colour is brownish grey, the discal band of fore wings is broader, and the hind wings are white, with broad brownish-grey borders and central irregular grey line as in *I. Anna*.

Expanse of wings $3\frac{2}{10}$ inches.

Kina Balu, N. Borneo (*Waterstradt*).

It is well separated from *I. Hageni*, Snellen, and *I. Anna*, because the transverse black line or band on fore wings above is differently placed. There are four males in the B. M. from Sandakan. It is no doubt a local form of *I. manlia*.

### *Ischyja dispar*, nov.

♂. Upperside like *I. Anna*, but the discal blue band on the hind wings above is broader, shorter, and more round; the palpi are brown, as in *I. manlia* and *I. Hageni*, Snellen, and not pure white beneath as in *I. Anna*; the mark in the inner disk is five-sided, in one example nearly round, but the sides are smooth and not irregularly sinuous as in *I. Hageni*; the orbicular is also round and very small. On the underside the colour is brownish grey, the band on fore wings is broader than usual in the genus, and the hind wings are entirely white, with a very faint indication of a sinuous central grey line and a little grey suffusion on the margins.

Expanse of wings $3\frac{3}{10}$ inches.

Lombok Island (*Everett*).

## Family **Deltoididæ.**

### *Zethes cauxa*, nov.

♂ ♀. Greyish ochreous, irrorated with minute brown atoms; thorax brown: fore wings with white linear-shaped orbicular and reniform marks: hind wings with a white linear spot at the end of the cell; both wings with the outer half brown, the division sharply and regularly defined; an indistinct sinuous submarginal line; a more or less distinct ochreous patch on the outer margin of fore wings immediately below the apex, in some examples this is very distinct, in others it is nearly obsolescent. The underside is clearer ochreous, with the markings showing through somewhat: fore wings with a small black patch in the cell, another on the middle of the outer margin, a subapical black dot; hind wings with a black diffuse subbasal band, a similar discal band, and a black patch on the middle of outer margin.

Expanse of wings 1 inch.

Kina Balu, N. Borneo (*Waterstradt*).

There are four examples in the B. M., unnamed, from Mount Marapok, N. Borneo, in Deltoid drawer no. 36.

### *Zethes salsoma*, nov.

♂ ♀. Dull ochreous grey, irrorated with minute dark grey atoms: fore wings with subbasal, antemedial, and medial, outwardly curved, dark grey sinuous thin bands, the last running through the dark grey lunule at the end of the cell; both wings crossed by a discal, irregular, and more or less dentated dark grey outwardly curved line, which meets the third band of fore wings at the hinder margin; the outer portion of both wings suffused with brown, containing a submarginal row of white lunular spots, from which proceed two or three ochreous-white streaks towards the margin, opposite the angle above the middle. Underside pale ochreous grey, irrorated with brown atoms, the outer third suffused with brown, containing three brown crenulated discal lines close together and submarginal white lunular spots.

Expanse of wings 2 inches.

Kina Balu, N. Borneo (*Waterstradt*).

The outer margin is excavated below apex of fore wings and angled in both wings. There are two examples unnamed in the B. M. from Bhamo, Burma, and Brunnei, Borneo, Quadrifid drawer, no. 211.

### *Zethes chilana*, nov.

♂ ♀. Olive-brown, with a slight purplish tinge: fore wings with a black lunule with a pale centre at the end of the cell; some ochreous dots on the costa towards apex; both wings with interior medial and discal, rather indistinct, brown, sinuous, transverse lines, the last expanding into deep black patches above the hinder margin on fore wings and in the middle on the hind wings, and rather close in places to the middle line; an indistinct pale sinuous submarginal line, black lunulated marginal line, and ochreous lunules in the interlined brown cilia, opposite the vein-points. On the underside there is a black subapical spot on fore wings, the transverse lines are more distinct, and the wing is somewhat marbled and variegated with brown patches and shades.

Expanse of wings $1\frac{1}{2}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

The underside is almost similar to that of *Z. vaga*, Walker, but all this group of *Zethes* much resemble each other on the underside.

### *Bleptina inconspicua*, nov.

♂ ♀. Of a uniform dark grey above, the orbicular a small white dot, the reniform white, large, and oblique: fore wings with three very sinuous, partly dentated and outwardly curved pale lines, white on and near the costa, antemedial, postmedial, and submarginal: hind wings with two indistinct similar lines, discal and submarginal, marginal brown lunules to both wings, pale marginal line and grey cilia. Underside: fore wings grey; hind wings nearly white with grey outer border; fore wings with the costa with white dots, both wings with brown cell-spots and discal and submarginal grey sinuous lines.

Expanse of wings $1\frac{2}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

There is a female from Sandakan in the B. M., unnamed, in Deltoid drawer no. 34.

### *Bleptina erectilinea*, nov.

♀. Olive-brown, tinged with ochreous, with chocolate-brown markings, transverse lines duplex with pale centres, first close to the base, second antemedial, both slightly outwardly curved and sinuous, a small white dot ringed with brown, as orbicular, just outside the second line, third line erect, very nearly straight, a square-shaped white reniform edged with brown, close on its inner side, a submarginal very sinuous line, the space between the two lines purplish brown, as is also the apex and a small space in the centre of the outer margin: hind wings brown, with indistinct sinuous pale lines central and submarginal; both wings with black marginal lunules, pale marginal line, and pale cilia with a brown base. Underside paler, with black cell-spots and discal and submarginal sinuous transverse black lines.

Expanse of wings $1\frac{1}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*); two examples.

This species somewhat resembles *B. dentilinea*, Hmpsn., from Sikkim, which I have also from the Khasia Hills.

### *Bleptina carta*, nov.

♂. Fawn-colour, irrorated with minute brown atoms: fore wings crossed by three straight brown lines, antemedial and medial, erect and parallel, the third runs from the apex to the hinder margin near the angle, between the last two lines is a thin somewhat sinuated and indistinct brown line; on the hind wing there is a straight discal line corresponding to the outer line of the fore wings, which is cut short by a brown suffused space below the apex, this suffusion extends more or less along the costa and on the inner portions of the wing, marginal line black, lunular; cilia ochreous.

Expanse of wings $1\frac{2}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

There is a female in the B. M. from Pulo Laut, unnamed, in the Deltoid drawer no. 34.

### *Bleptina pulla*, nov.

♂. Of a uniform dull olive-brown colour, a prominent black lunule at the end of the cell of fore wings, a pale line with brown edges across the disk of both wings, nearly straight and erect in fore wings, outwardly curved on hind wings, indications of a sinuous submarginal line, marginal lunules black; cilia with a pale base. Underside of a dull pale greyish brown, a brown lunule at the end of each cell, a transverse grey thin band pale on its outer edge, across both wings, discal and erect on fore wings, medial and outwardly curved on hind wings.

Expanse of wings $1\frac{1}{2}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

The third joint of the palpus is short and thick, and both second and third joints have long thick hair on the upperside; the antennæ have short bristles on each side.

### *Asthala sphærula*, nov.

♂ ♀. Of a uniform dark chocolate-brown; the orbicular a white dot; the reniform a white ring nearly round with a brown centre: fore wings with the transverse lines duplex and sinuous, with dull ochreous centres, first antemedial before the orbicular, the second discal, beyond the reniform, the third submarginal: hind wings with indications of discal and submarginal lines towards the anal angle; both wings with black marginal lunules and pale marginal line. Underside grey, with brown cell-spots and discal submarginal brown sinuous lines.

Expanse of wings $1\frac{3}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

Marked above and below somewhat similarly to *Asthala silenusalis*, Walker, of which I have received a long series from the same locality, but the wings are shorter; the one-sided pectinations of the antennæ are so minute, it requires a strong glass to see them at all; the reniform is round instead of being ear-shaped, and the underside is differently coloured, and the bands are closer together.

### *Adrapsa Editha*, nov.

♂ ♀. Of a uniform purple-brown; a white prominent lunule at the end of cell in male only: both wings crossed by three sinuous blackish-brown bands, antemedial, medial, and discal, the second band extending only from the cell lunule to the hinder margin and nearly straight, the third band with a curve outwards in its middle, a submarginal sinuous pale band, a black marginal lunular line, and white marks in the cilia at the vein ends. Underside greyish, with the bands as above, but prominent and distinct.

Expanse of wings $1\frac{8}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

Three males and twelve females. The antennæ are as in the subgenus *Asthala*, Moore, but the shape of the wings is very different to that of *silenusalis*, Walker, being long and somewhat narrow.

### *Adrapsa thermesia*, nov.

♂ ♀. Of a uniform dark olive-brown: fore wings with a large prominent black spot at the end of the cell, a large ochreous square patch on the outer margin at the apex, a brown smear on the costa within the patch; antemedial and postmedial outwardly recurved sinuous dark-brown lines, the former inwardly and the latter outwardly edged with ochreous: hind wing with a similar medial line; both wings with indistinct sinuous ochreous submarginal line, black marginal line, and ochreous lunules in the black cilia opposite the vein ends. Underside paler, lines similar but very distinct, and all three complete in both wings; a black spot with ochreous centre at the end of each cell, and a black apical patch in the ochreous square at apex of fore wings.

Expanse of wings $1\frac{1}{2}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

A long series. The male has an ochreous anal tuft; the antennæ are waved, but have no distortion, and are unipectinate with long spines and cilia; it much resembles *Onevatha ereboides*, Walker, but the antennæ and palpi are quite different.

### *Oxænanus marmorea*, nov.

♀. Black, very uniform in colour: fore wings with a white lunular streak at end of cell, and three transverse white lines, first before the middle, second discal, both slightly sinuous and outwardly curved; third line submarginal, connected with the outer margin by a white subapical spot, with the apical space in one specimen smeared with white, in the type specimen with four duplex white spots on the fringe below the apex: hind wings with only two outer lines, corresponding to those on the fore wings, the inner one being medial: both wings with the marginal line dark black; cilia paler black, with a basal pale line. Underside blackish brown, a white lunule at the end of each cell; outer lines and apical marks as above, and a general variegated and marbled appearance on both wings.

Expanse of wings $1\frac{6}{10}$ inch.

Kina Balu, N. Borneo (*Waterstradt*).

Two examples.

# LXX.—*Some Points in the Morphology and Classification of the* Opiliones. By R. I. Pocock.

[Plates IX. & X.]

## Part I.—The Classification of the *Plagiostethi.*

In 1873 Sörensen (Nat. Tidskr. (3) viii. pp. 514–515) classified the Opilionides into two tribes—Opilionini for the typical genera, and Trogulini for *Ischyropsalis*, *Nemastoma*, *Dicranolasma*, *Trogulus*, and allied forms. From this classification it may be inferred that in the opinion of its author *Ischyropsalis* is more nearly related to *Nemastoma* and *Trogulus* than to the Phalangiine Opiliones, or Opilionini genuini as Sörensen called them. Subsequent authors have apparently been unable to divest themselves wholly of this view of the matter.

Three years later Thorell proposed the following classification (Ann. Mus. Genov. viii. pp. 462–469, 1876):—

Fam. I. Phalangioidæ.
    *Phalangium* &c. and *Sclerosoma.*

Fam. II. Nemastomoidæ.
  Subfam. 1. Nemastomini.
    A.—*a. Ischyropsalis.*
      *b. Nemastoma.*
    B. *Dicranolasma.*
  Subfam. 2. Trogulini.
    *Trogulus* and *Anelasma.*

This classification, an expansion of Sörensen's, involves the supposition on Thorell's part that *Ischyropsalis* is more nearly related to *Trogulus* than to *Phalangium,* since the two forms are classified together in a group equal to the group containing *Phalangium* and its allies. The association, moreover, of *Ischyropsalis* with *Dicranolasma* in one subfamily, contrasted with another containing *Trogulus*, attests the belief that *Dicranolasma* is more nearly allied to *Ischyropsalis* than it is to *Trogulus.*

Both these conceptions are unquestionably erroneous.

Simon, in 1879 ('Arachnides de France,' vii.), in an excellent treatise on the Opiliones of France, with stray notes upon exotic forms, proposed the following taxonomy of the genera :—

Fam. PHALANGIIDÆ.
  Subfam. 1. Sclerosomatinæ.
    *Sclerosoma* &c.
  Subfam. 2. Phalangiinæ.
    *Phalangium* &c.

Fam. ISCHYROPSALIDÆ.
    *Ischyropsalis* &c.

Fam. NEMASTOMATIDÆ.
    *Nemastoma.*

Fam. TROGULIDÆ.
  Subfam. Dicranolasmatinæ.
    *Dicranolasma, Amopaum.*
  Subfam. Trogulinæ.
    *Trogulus, Anelasmocephalus.*

This classification, which was followed in the main by Hansen (Nat. Tidskr. 1884), by Sörensen (Nat. Tidskr. 1884, Term. füzetek, xvii. 1894), Kraepelin (Mitth. Mus. Hamb. xiii. 1896), Becker (Arach. Belg.), and O. P. Cambridge (P. Dorset Field-Club, xi. 1890), is more in accord with the facts; but I do not think the arrangement of the genera into four equivalent sections fully expresses their true relationships. Moreover, in the key to the determination of these families, they are grouped under two primary headings, the first containing the Phalangiidæ, and the second the Ischyropsalidæ, Nemastomatidæ, and Trogulidæ, a method which suggests a covert adherence to the views of affinity originally promulgated by Sörensen.

That the Palpatores or Plagiostethous Opiliones fall into the four families instituted by Simon is thus generally admitted, but that these families are naturally groupable into the two sections which are also usually adopted is, I am persuaded, an erroneous view. They fall into two groups, it is true, but the line of division comes, not between the Phalangiidæ and Ischyropsalidæ, but between the Ischyropsalidæ and Nemastomidæ, *Ischyropsalis* being far more nearly related to *Phalangium* than to *Nemastoma.*

This proposition, so contrary to what is usually accepted, may be easily justified.

The sternal surface of the prosoma in the Phalangiidæ is furnished with a relatively large, usually longitudinally oblong, anterior plate or *labium*, which underlies and is partially united to the maxillary processes of the legs of the first pair. Behind, with its free anterior edge overlapping the posterior border of the labium, lies a second sternal plate, which is shorter and wider than the first, with its long axis transverse and its posterior border straight or nearly so. Jutting inwards on each side from the proximal end of the coxa of the second leg is a movable maxillary sclerite, which underlies and supports the labium, and the proximal end of the coxa of the fourth leg projects forwards on the admedian side of that of the preceding coxa, partially excluding it from approaching the middle line of the sternal area. (Pl. IX. fig. 1 A.)

In the structure of its two sternal plates *Ischyropsalis* resembles the Phalangiidæ, as also in the forward prolongation of the proximal end of the coxa of the last leg. The chief difference between the two, so far as the structures in question are concerned, lies in the fact that the maxillary process of the coxa of the second leg is shorter and directed vertically downwards [*]. (Pl. IX. fig. 1 B.)

In *Nemastoma*, *Dicranolasma*, *Trogulus*, and *Metopoctea*, on the contrary, the labium is small, cordate or piriform, or almost suppressed, and is lodged between the maxillary processes of the legs of the first pair; its posterior border is continuous with and flexibly fixed to the anterior end of the sternum, and the sternum itself lies longitudinally, immovably wedged between the coxæ, narrowed in front between those of the first pair of legs and expanding posteriorly into a triangular plate or a right and left branch, forming a ⅄-shaped sclerite. Moreover, there is no maxillary process on the coxa of the second pair of legs, and the coxa of the fourth leg does not send forward a process on the proximal side of that of the third leg. (Pl. IX. figs. 2, 3 A, and Pl. X. fig. 3 B.)

I have been able to examine the sternum only in the genera mentioned above. No doubt, however, a similar arrangement will be found in the other genera of Trogulidæ [†].

There is, then, a radical difference between the sternal sclerites of the Phalangiidæ and Ischyropsalidæ on the one hand, and of the Nemastomidæ and Trogulidæ on the other, enabling us to classify these four families into two groups. These I propose to call Apagosterni and Eupagosterni *.

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[*] As characters serving to distinguish *Ischyropsalis* from the Phalangiidæ the fixity and smallness of the maxillary lobe of the second pair of legs and the immobility of the coxæ of the legs have often been urged. But neither the maxillary process nor the coxæ are fixed; they are movable, as may be easily demonstrated by holding a specimen of *Ischyropsalis* under the microscope and manipulating the parts in question with a needle. They are not so movable as in the Phalangiidæ certainly, but equally certainly the coxæ are not fixed, as are those of *Gonyleptes* or *Trogulus*, nor is the maxillary process fixed in the sense that the ocular tubercle is fixed.

[†] In his diagnosis of *Amopaum* Simon, in 1879, says "*pièce labiale plane et large*"; yet Sörensen, in 1884, enumerates amongst the characters distinctive of the Nemastomoidæ and Troguloidæ, including *Amopaum*, "*labium sternale minutum.*" I am unable to reconcile these statements.

In none of the systematic works quoted above have I found the sterna of the Nemastomidæ and Trogulidæ described.

In speaking of the sternum of the Opiliones in general, Simon confined his remarks, so far as the Plagiostethi (Palpatores) are concerned, to the Phalangiidæ (*loc. cit.* p. 121). Had he examined the sternum in *Trogulus*, *Nemastoma*, and *Dicranolasma*, he would hardly have described this plate as "très-court, transverse" (p. 157) in the Plagiostethi. In short, his account of the Plagiostethi contains no statement of the structural differences pointed out above.

Thorell, on the other hand, appears to have searched for the sternum at least in *Trogulus*, but with what measure of success may be gathered from his statement that in this genus two small oblique laminæ, meeting at an angle in front and united to the base of the coxæ of the first pair of legs, seem to take the place of the sternum and labium (p. 468, 1876). These "oblique laminæ" are the thickened and elevated edges of the coxæ in question.

In the present year (Zool. Anz. xxv. p. 445) Börner writes:—"Auch bei *Trogulus tricarinatus* fand ich keine Unterlippe, aber ebenfalls kein eigentliches Sternum; die Chitinhaut zwischen den Hüften der 4 letzten Beinpaare ist nur schwach und gleichmässig chitinisiert und kaum als Sternum aufzufassen; hier schliessen die Coxalfortsätze der 3 Extremität den Mund hinten ab. Bei *Nemastoma* findet man ein kleines Sternum zwischen den Hüften der 3 Extremität, hinter den Coxalfortsätzen; es ist ohne labiale Function, die von den Kauladen der 3 Extremität ausgeübt wird; andere sterna fehlen hier. . . . Da der Genitaldeckel . . . zwischen den Hüften . . . des letzten Beinpaare (*Trogulus*, *Nemastoma*, Phalangidæ etc.) liegt . . . fehlen bei den Opiliones meist das Tetra-, Penta- . . . und Metasternum" [= sternal plates of the somites of the prosoma]. And in the table (p. 439) showing the persistence and suppression of the sternal plates in various genera of Arachnida the sterna of the third and fourth somites [*i. e.*, represented by the first and second pairs of legs] in *Trogulus* are bracketed as "schwach chitinisiert," those of the fifth and sixth as replaced by the genital plate; in *Nemastoma* that of the third [*i. e.*, the *labium*] is indicated as present, those of the fourth, fifth, and sixth bracketed as replaced by the genital plate.

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* ἀπαγής, loosely knit or unfixed; εὐπαγής, well fixed or firmly knit; and στέρνον, the breast.

I cannot agree with this interpretation of the facts. It appears to me that in all Opiliones, including the Anepignathi (*Leptopsalis* &c.), the sternal sclerite that lies behind the labium represents the sternal elements of the posterior four somites of the prosoma, and is strictly homologous throughout the order.

In addition to the features mentioned above, *Ischyropsalis* differs from *Nemastoma* and the Troguloid genera, and resembles the Phalangiinæ, in the separation of the carapace from the tergites of the opisthosoma, the presence of a deep transverse groove on the posterior portion of this plate, the exposure of the apertures of Krohn's glands, the suppression of the anal sternite, the absence of lateral anal valves, and the dentition of the digits of the cheliceræ. The large size of the cheliceræ even is a character shared by such genera of Phalangiinæ as *Rhampsinitus* and *Pantopsalis*. Added to all these features is the presence of a movable styliform process at the extremity of the penis—a character which Simon pointed out as distinctive of the Phalangiidæ, although he was not able to test the supposed absence of this structure in *Ischyropsalis*. In fact, in almost all its characters, except the shortness of the terminal segment of the palpus, the suppression of the palpal claw, the absence of tibial spiracles, and the direction of the maxillary process of the second pair of legs, *Ischyropsalis* is essentially Phalangiine in structure. These four characters justify the formation of a separate family for *Ischyropsalis* and its allied form *Sabacon*, which is unknown to me; but when balanced in the scale against the many deep-seated characteristics separating this family from the Nemastomidæ, its next of kin amongst the Eupagosternous genera, they have but little weight.

One other small point connected with the affinities of *Dicranolasma* remains to be mentioned. This genus was placed nearer to *Nemastoma* than to *Trogulus* by Thorell and nearer to *Trogulus* than to *Nemastoma* by Simon. So far as the facts dealt with by the two authors were concerned, Thorell's view appears to me to be the more correct; of the two, Simon relied solely upon the presence of the frontal processes in classing the genus with *Trogulus*, whereas in the structure of the appendages, of the sternites of the opisthosoma, and of the last two tergites the affinities are very decidedly more Nemastomine than Troguline. The sternal plates of the prosoma are, however, more like those of *Trogulus* than of *Nemastoma*. Perhaps, therefore, the most satisfactory method of dealing with *Dicranolasma* is to regard it as the type of a special family.

The Palpatores or Plagiostethous Opiliones may be classified then as follows :—

*a.* Anterior sternal plate (*labium*) small, wedged in between the sterno-coxal or maxillary processes of the appendages of the third pair (first pair of legs); posterior sternal plate with its long axis longitudinal, narrow in front, where it lies between the coxæ of the appendages of the third pair, expanding posteriorly and sending out a right and left process, against which the coxæ of the fifth and sixth appendages (third and fourth legs) abut, its posterior border being strongly or moderately emarginate; the proximal end of the coxæ of the sixth appendage narrowed and not overlapping that of the fifth towards the middle line; coxa of the fourth appendage without a movable sterno-coxal process. Dentition of digits of chelicerae evenly serrulate. Penis of male without movable terminal sclerite beyond the orifice (sec. Simon) ............................ **Eupagosterni.**

$a^1$. Sternites of opisthosoma free, overlapping, without median divisional sulcus; first and second (genital and tracheal) narrowed anteriorly and conically produced between the coxæ of the prosoma, and only overlapping the posterior two pairs to a relatively small extent; eighth or penultimate tergite large, greatly expanded laterally, the ninth or anal considerably larger than the anal sternite and than the lateral anal valves; labrum elevated, subacute; legs longish, with protarsi distally slender, not wider than the tarsi, which are multiarticulated.

$a^2$. Ocular tubercle normal, bearing the two eyes and situated a little distance behind the anterior border of the carapace; sternum thickly chitinized, inversely Y-shaped .............. Fam. Nemastomidæ.

$b^2$. Ocular tubercle absent, its place taken by a pair of horizontally arched frontal processes, bearing the eyes near the middle of their length and overhanging the chelicerae; sternum less strongly chitinized, very narrow in front, broadly triangular behind .... Fam. Dicranolasmidæ.

$b^1$. Sternites of opisthosoma, except the genital and anal, fused, not overlapping, and marked by a median longitudinal sulcus; first and second (genital and tracheal) widely rounded anteriorly and considerably overlapping the proximal extremities of the two posterior pairs of coxæ; eighth or penultimate tergite small and narrow, not expanded laterally; the ninth or anal subequal in size to the anal sternite and lateral valves; labrum flat; legs shorter and stouter, with protarsi distally broader than the tarsi, which are pauciarticulated; carapace with frontal processes concealing the appendages of the first two pairs; sternum as in *Dicranolasma*, but with the posterior expanded portion shorter and wider ........................ Fam. TROGULIDÆ.

*b*. Anterior sternal plate (*labium*) large, subquadrate, as long as or longer than the posterior sternal plate and underlying the sterno-coxal or maxillary processes of the appendages of the third pair (first pair of legs); posterior sternal plate with its long axis transverse, at least twice as wide as long, its posterior border straight, not emarginate; proximal end of the coxæ of the sixth appendages sending forwards a process on the proximal or inner side of those of the preceding appendages; coxæ of fourth pair (second leg) with distinct and movable sterno-coxal (maxillary) process. Dentition of digits of cheliceræ uneven, lobate. Penis of male with movable terminal style .................. **Apagosterni.**

$a^3$. Terminal segment of palpus shorter than the penultimate and clawless; postero-inferior edge of the coxæ of the appendages of the last pair not fused with the adjacent sternal plate of the opisthosoma; maxillary process of second leg directed vertically downwards; no tibial spiracles............ Fam. ISCHYROPSALIDÆ.

$b^3$. Terminal segment of palpus much longer than the penultimate and armed with a small claw; coxa of sixth appendage united near its base on the posterior side to the tracheal sternite of the opisthosoma; maxillary process of second leg directed horizontally inwards; tibial spiracles present ...... Fam. PHALANGIIDÆ.

$a^4$. Carapace not fused with the anterior five tergites of the opisthosoma; apertures of Krohn's glands exposed . Subfam. *Phalangiinæ*.

$b^4$. Carapace and anterior five tergites of opisthosoma fused into a single dorsal shield; apertures of Krohn's glands concealed ..................... Subfam. *Sclerosominæ*.

## Part II.—The Position and Classification of the *Insidiatores.*

Up to 1900 there was a tacitly admitted or openly expressed agreement that the Opiliones, apart from the Anepignathi or Cyphophthalmi, fall into two nicely balanced groups—the Palpatores or Plagiostethi and the Laniatores or Mecostethi. In the year named this arrangement was disturbed by Dr. J. C. C. Loman (Zool. Jahrb., Syst. xiii. p. 80), who proposed the suborder Insidiatores for the family Triænonychidæ of Sörensen—a family resembling the Laniatores in all essential characters except the presence of a single claw on the tarsi of the fifth and sixth pairs of appendages, as in the Palpatores. The characters in which the Palpatores differ from the Laniatores are numerous and have been pointed out by Thorell, Simon, and especially Sörensen. In Loman's opinion the systematic value assignable to the claws is equal to that of all the other structural characters combined. In the present year (Zool. Jahrb. xvi. pp. 170–171) he tabulates the characters of the three suborders, and adds to his earlier diagnosis of the Insidiatores two additional features in which they resemble the Palpatores and differ from the Laniatores—namely, the presence of two receptacula seminis in the female and of an erectile muscle for the glans of the penis in the male. Judging, however, from his tabulation of the characters, the Insidiatores are at one with the Laniatores in the segmentation of the opisthosoma, the structure of the palpi, of the coxæ of the appendages, and of the sternum of the prosoma, in the wide distance between the mouth and genital orifice, in the number of the saccular diverticula of the alimentary canal, the structure of the lubricating-glands of the penis, and the structure of the ovipositor.

It appears to me that a greater value must be assigned to these many points of resemblance than to the three points of difference above alluded to, and that the Triænonychidæ or Insidiatores must still be classified with the Laniatores in a group equivalent to the Palpatores. Nevertheless it is evident that they differ from the remaining families of Laniatores in characters of greater importance than those used to distinguish these said families from each other. Hence it is perhaps advisable to accept the Insidiatores as a group equivalent to the Laniatores, and to classify them together under the Mecostethi. I propose therefore the following classification of the Opiliones:—

A. Plagiostethi (=Palpatores).
  *a.* Apagosterni.
  *b.* Eupagosterni.

B. Mecostethi.
  *a.* Insidiatores.
  *b.* Laniatores.

C. Cyphophthalmi (=Anepignathi[*]).

The characters separating the Apagosterni and Eupagosterni, however, are of much higher value, in my opinion, than those separating the Insidiatores and Laniatores. The sternal plate of the prosoma in the Laniatores shows great constancy in shape as compared with that of the Insidiatores. The Laniatores are divided into several families, in all of which the sternum exhibits but little variation from the normal characteristic of the Mecostethi. It seems logical, therefore, to conclude that when striking variations from this type are met with in the Insidiatores, such variations, if constant, should form the basis for the establishment of groups of "family" rank. I propose consequently to divide the Insidiatores, which by Sörensen and Loman are considered to be represented by the single family Triænonychidæ, into the following groups of this rank, postulating that the structural features on which they rest have at least the same value as those used for the same purpose in the Laniatores :—

*a.* Sternum very narrow and compressed between the coxæ of the appendages of the fifth pair, abruptly expanding between those of the sixth, and showing a lanceolate or narrowly cordate expansion opposite the line of junction of the coxæ of the fourth and fifth pairs of appendages.
  *a*$^1$. Posterior expansion of sternum narrow, subpentagonal, not wider than long, much narrower than the length of the area between the fifth appendages; stigmata exposed ...... Fam. Triænonychidæ.
  *b*$^1$. Posterior expansion of sternum transversely arcuate, laterally pointed, much wider than long, much wider than the length of the narrow area lying between the coxæ of the fifth appendages; stigmata concealed .... Fam. Triænobunidæ, nov.

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[*] This name is of later date than Cyphophthalmi, and was based upon a misconception.

*b.* Sternum not narrow and compressed between the coxæ of the fifth appendages, wider at this point than in front, either narrowly triangular and gradually expanding from before backwards between the coxæ of the fifth appendages or narrowly pentagonal and somewhat abruptly expanding between them; stigmata concealed ................ Fam. ADÆIDÆ, nov.

The Insidiatores are confined to the southern portion of the Great Continents. The Triænonychidæ contain the genera *Acumontia* from Madagascar; *Diasia* from Chili; *Triænonyx* from Chili, New Zealand, Australia, and Fiji; *Nuncia*, which is hardly separable generically from *Triænonyx*, from New Zealand; and two new genera to be shortly described, one from New Zealand, the other from Tasmania.

The characters of the Triænobunidæ are taken from a specimen belonging to a Tasmanian species in the British Museum which I refer to *Triænobunus.* The type of the latter was from Queensland.

The Adæidæ are represented by two genera. *Adæum*, of which the British Museum has examples, is confined to S. Africa and New Zealand.

The genus *Larifuga*, to which belongs *P. rugosum*, Guér., of which the type is in the British Museum, is also S. African.

## Part III.—FURTHER NOTES ON THE STERNA AND ON THE SEGMENTATION OF THE ABDOMEN.

In the paper already quoted Börner states that, on account of the forward projection of the genital plate between the coxæ of the appendages of the sixth pair in *Leptopsalis* and *Pachylus* and the encroachment of the coxæ of the fourth and fifth pairs towards the middle line in the members of the group—the Mecostethi—to which *Pachylus* belongs, the sternites of the fourth, fifth, and sixth somites of the prosoma are mostly wanting in these groups, although in *Leptopsalis* amongst the Anepignathi or Cyphophthalmi that of the fifth persists; and in the table, also cited above, the sterna of the fourth and fifth somites are indicated as absent in *Pachylus* and that of the sixth as replaced by the genital plate.

It is difficult to reconcile this opinion with the known facts. In the Mecostethi (including *Pachylus*) the sternal plates of the fourth, fifth, and sixth somites of the prosoma are represented by a firmly chitinized, narrow, unsegmented, longitudinal plate lying between the coxæ of the fourth and fifth pairs of appendages and abutting against the inner angles of those of the sixth in front of the generative orifice, where it is slightly (*Gonyleptes*) or considerably (*Adæum*) expanded *. This expanded portion is overlapped by the genital plate, and frequently the maxillary processes of the fourth pair overlie its anterior portion in the middle line (Oncopodidæ, Triænonychidæ, Biantidæ, &c.), although it is uncovered in the Gonyleptidæ and Cosmetidæ.

Börner has also, I think, misinterpreted the sterna of the opisthosoma in *Trogulus*. The large plate following the genital operculum is numbered 4 and the following plate 5 (fig. 11, p. 443), and it is to be inferred that these plates correspond to those numbered 4 and 5 in the figures of *Leptopsalis* and *Pachylus*, the fourth being that which bears the stigmata and the fifth the next following. But in *Pachylus* and, I believe, all Laniatores and most Palpatores, except some Phalangiidæ (e. g., *Sclerosoma*), the sterna Börner has designated 4 and 5 in the case of *Pachylus* are united to form a single plate, the line of demarcation being represented by a shallower or deeper groove or scarcely at all traceable. In *Trogulus* the divisional line is, I think, quite obliterated. If so, the sternal plate marked 4 by Börner for this genus should have been marked 4 + 5 to bring it into harmony with those of *Pachylus*, and the sternum marked 5 should be 6. This method of enumeration arrives at numerical similarity in the sternal plates in the two genera, instead of leaving *Trogulus* with one plate short. *Trogulus* is an exceedingly specialized genus, and the key to its morphology is to be found in its less specialized allies *Dicranolasma* and *Nemastoma*. Both these genera have the same number of sternal plates as *Pachylus*, namely, seven, including the genital and the anal, and the second is marked by a transverse impression, as in *Pachylus* and many other genera of Laniatores, indicating its primitive double origin. I think there can be no reason to doubt that this transversely impressed second plate in *Dicranolasma* is the homologue of the unimpressed second plate in *Trogulus*.

In the Laniatores and Palpatores eight sternal plates are to be traced with certainty. The first is the genital, the second the tracheal, and the eighth the anal. In all Laniatores the second and third are fused, though the line between the two is very deep and strong in some forms (e. g., *Biantes*).

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* In the article "Arachnida" in the supplementary issue of the Encycl. Britannica, p. 544 (1902), under the heading Laniatores the insertion of the words "of the fifth pair" was an error which was overlooked in the correction of the proof. Also under the family Cryptostemmidæ (p. 543), for *Anthracomartus* read *Poliochera*.

In the Eupagosternous Palpatores the divisional line between the second and third is feebly (*Dicranolasma*) or not at all (*Trogulus*) marked, and the eighth is small.

In all the Apagosternous Palpatores, except *Taracus* belonging to the Ischyropsalidæ, the eighth is suppressed, the anal tergite closing against the posterior border of the seventh. Similarly in all the members of this group the first or genital is not or scarcely differentiated from the second, and only in some cases (e. g., *Sclerosoma*) is there a deep groove between the second and third. Hence in the Phalangioid Palpatores the number of sternites may be reduced to six, (1) by the suppression of the eighth (anal) and fusion of the first (genital) with the second (tracheal) in *Sclerosoma*; (2) by the fusion of the first, second, and third into a single plate in *Taracus*, or even to five by the fusion of the first, second, and third, and the suppression of the eighth, as in most Phalangiinæ.

Finally, in many genera of Laniatores the eighth shows indications of being composed of two sternites, which would bring the total number of sternites up to nine, thus equalling the tergites in number and agreeing precisely with the number of sternites found in the young of *Pettalus* and the adults of the species of *Stylocellus* (*Leptopsalis*) amongst the Anepignathi (Cyphophthalmi), the third suborder into which the existing Opiliones fall, and also with the numbers found in the genera of the Carboniferous Anthracomarti, as I have recently shown (Geol. Mag. 1902, Oct. and Nov.).

## EXPLANATION OF PLATES IX. & X.

*Fig.* 1. The ventral surface of the prosoma of a species of *Gagrella* (1 A), one of the Phalangiidæ, and of *Ischyropsalis* (1 B), one of the Ischyropsalidæ, with the genital prolongation of the opisthosoma removed, to illustrate the structure of the sternal plates &c. in the Apagosterni. II–VI, basal segments of the appendages from the second to the sixth pairs; *mx.* 2, *mx.* 3, *mx.* 4, maxillary processes of the second, third, and fourth appendages; *st.* 1, anterior sternal plate or labium; *st.* 2, posterior sternal plate, the so-called sternum proper; *mb.*, membrane forming the roof of the genital canal, representing, perhaps, the sternal area of the genital somite.

*Fig.* 2. Ventral surface of the prosoma of a species of *Nemastoma*, one of the Eupagosterni, with the genital prolongation of the opisthosoma removed. I–VI, basal segments of the appendages; *lr.*, labrum; *mx.* 2, *mx.* 3, maxillary processes of second and third pairs of appendages; *st.*, sternal plate attached anteriorly to the piriform labium; *mb.*, membrane forming the roof of the genital canal, and representing, perhaps, the sternal area of the genital somite.

*Fig.* 3. Ventral surface of the prosoma of a species of *Dicranolasma* (3 A) and of *Trogulus* (3 B), two of the Eupagosterni, with the genital prolongation of the opisthosoma removed. The lettering as in fig. 2. (For the sake of clearness the distinctness of the labium in these figures is exaggerated.)

*Fig.* 4. Median portion of ventral surface of prosoma of a species of *Adæum* (A) and of *Triænobunus* (B), with the genital plate of the opisthosoma removed. III–VI, coxæ of the third to the sixth appendages; *lb.*, labial portion of sternum; *mx.* 3, *mx.* 4, maxillary processes of third and fourth pairs of appendages; *st.*, sternum overlapped in front by the coxæ of the fourth appendage on each side; *mb.*, membrane in front of the genital orifice (*g*), representing, perhaps, the sternal area of the genital somite. C. Sternum of *Larifuga* (after Loman).

*Fig.* 5. Median portion of ventral surface of prosoma of a species of *Acumontia* (A), one of the Triænonychidæ, and of a species of Gonyleptidæ (B). Lettering as in fig. 4.

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## LXXI.—*On the Mole of the Roman District.*

By Oldfield Thomas.

The British Museum owes to the kindness of Dr. L. Sambon two moles obtained by him during the important malaria experiments carried out by him during the summer of 1900.

An examination of the skulls of these specimens shows that they differ widely both from the common European mole (*Talpa europæa*) and Savi's mole (*Talpa cæca*) by the very much greater size of their teeth and certain other cranial characters, and are clearly separable specifically. *Talpa cæca* has, if anything, even smaller teeth than *T. europæa.*

### *Talpa romana*, sp. n.

Colour and proportions about as in *T. europæa*; orbits apparently covered by skin, but this is not absolutely determinable.

Skull of about the same length as that of *T. europæa,* but somewhat more heavily built; zygomata thicker and perceptibly longer, their hinder end starting from the brain-case nearer its external angles and nearly or quite above the anterior part of the meatus instead of wholly in front of it; lacrymal foramina markedly larger than usual.

Teeth, and especially molars, conspicuously larger throughout; upper incisors broad, closely touching one another, the median pair larger in proportion to the others than in the common mole; molars much larger and heavier in every direction, broader, with larger internal lobes, higher and longer than in any other European form. The combined length of

Fig. 1 A.

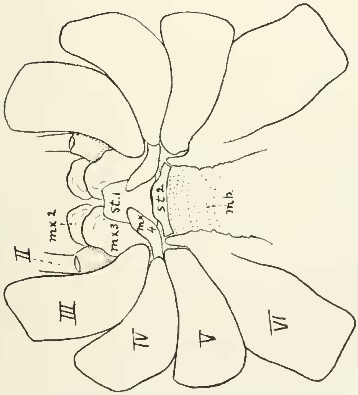


Fig. 1 B.

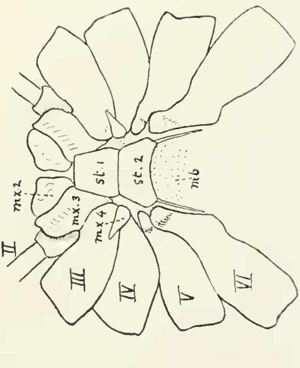


Fig. 2.

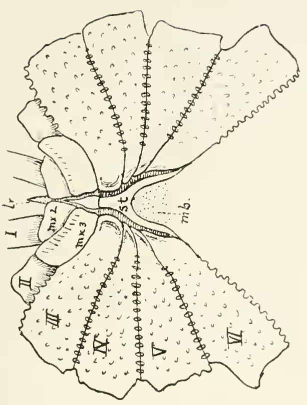


Fig. 3 A.

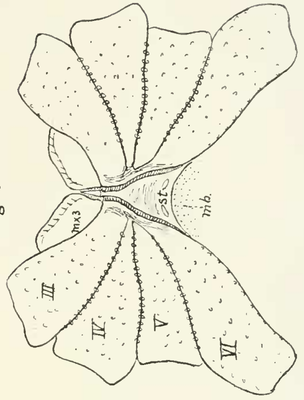


Fig. 3 B.

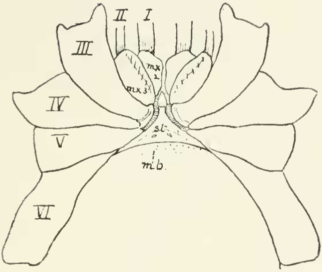
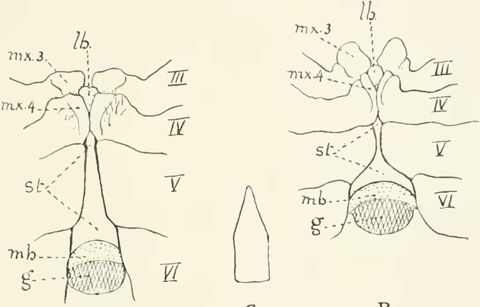
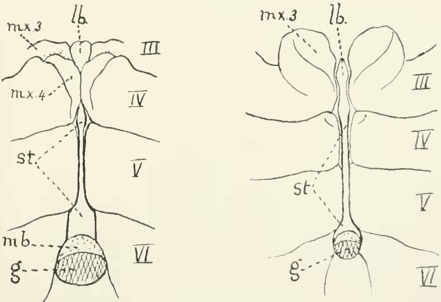


Fig. 4.



A. C. B.

Fig. 5.



A. B.

the three upper molars is 7·5 millim. as compared with 6·2 in *T. europœa,* and of the lower 8·1 as against 6·8; the breadth of $m^2$ is 3·0 as against 2·1, and of $m_2$ 2·0 against 1·3. The difference in the height of unworn teeth is equally striking. Second lower molar with a small supplementary external basal cusp at the bottom of the valley separating the main cusps; last molar with a slight indication of the same cusp, which is not found in *Talpa europœa* or *cœca*; although very possibly not constant, its presence is noteworthy.

Dimensions of the type (measured in skin):—

Head and body 126 millim.; tail 29; hind foot (s. u.) 19.

Skull: greatest length 36·7; basal length 31·6; zygomatic breadth 15; mastoid breadth 17·8; interorbital breadth 8; palate, length 16·2, breadth outside $m^1$ 11·1, inside $m^1$ 4·7.

*Hab.* Neighbourhood of Rome. Type from Ostia; a second specimen from Frascati.

*Type.* B.M. no. 1. 1. 2. 8. Collected August 1900, and presented by Dr. L. Sambon.

This mole, by its powerful teeth, is remarkably different from all its allies, and it is most surprising that it has not been distinguished before.

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## BIBLIOGRAPHICAL NOTICES.

*First Steps in Photo-Micrography. A Handbook for Novices.* By F. Martin Duncan, F.R.H.S. London: Hazell, Watson, and Viney, 1902. Pp. 104. Price 1*s*.

This little book should prove a useful guide to the difficult art of photo-micrography. Commencing at the very beginning of the subject, the reader is led by gradual steps onwards until the photography of such minute objects as bacteria is reached. The first part of the book is devoted to the actual process of taking the photograph, the second to developing the negative, printing, and the preparation of objects. The apparatus employed is fully described, and directions are given for its home-manufacture, together with a number of practical "tips," the outcome of the author's experience. The directions given for the preparation of objects are necessarily brief, but are, perhaps, sufficient for the beginner. A concluding chapter deals with stereo-photo-micrography, and the advantages of this neglected branch are emphasized.

*Report on the Collections of Natural History made in the Antarctic Regions during the Voyage of the 'Southern Cross.'* London: the Trustees of the British Museum. Pp. 344, pls. liii. 1902.

Zoologists both of the present generation and for generations to come will doubtless hold the name of Sir George Newnes in grateful remembrance for his splendid munificence in fitting out the expedition of the 'Southern Cross' in 1898 for the exploration of the inhospitable regions of the Antarctic. Thereby the cause of science has been materially furthered and we have advanced a stage in our knowledge of these mysterious and dread shores.

The present handsome volume, embodying the zoological, botanical, and mineralogical results of the expedition, has been published by the Trustees of the British Museum in return for the handsome donation of the first set of all the specimens collected. The names of the authorities selected to work out the collections are a sufficient guarantee that the best account possible has been obtained of the several groups—animals, plants, and minerals—that were obtained during these two years of arduous work.

Captain Barrett-Hamilton's Report on the Seals will prove an extremely valuable addition to our knowledge of these animals, more especially as regards their dentition and the modifications thereof. Undoubtedly the most valuable of his observations is his contention that the remarkable and unique teeth of *Lobodon*, which apparently feeds almost entirely on *Euphausia*, serve the purpose of a sieve like the baleen of the Balænidæ. It is a pity that figures of these teeth were not given, since space is found for a whole plate showing the dentition of *Ommatophora*. Not that these last are not worthy of the space they occupy; on the contrary, on account of their extraordinary individual variability their omission would have been a mistake.

It is a matter for serious regret to read at the end of Capt. Hamilton's introduction that, owing to the want of care after the death of the zoologist Nicolai Hanson and the unfortunate and inexplicable loss of his notes, the skulls are practically worthless, so that the "whole work will have to be performed again from the collections procured by the various expeditions which started in 1901."

The Report on the Birds has been prepared by Dr. Bowdler Sharpe, who has contrived to make it one of the most interesting in the whole volume. By a series of judiciously selected quotations from the published records of Mr. Bernacchi, the magnetic observer, Mr. Hugh Evans, the assistant zoologist of the expedition, Mr. Howard Saunders, and others, he has brought the account of the Antarctic avifauna completely up to date.

The Fishes were entrusted to Mr. Boulenger, who has described eight new species, two of which belong to hitherto undescribed genera.

Of the Invertebrates the most important contributions are those on the Mollusca by Mr. Edgar Smith, the Crustacea by Mr. T. V. Hodgson, now the zoologist of the 'Discovery' expedition, the Polychæta by Dr. Arthur Willey, and the Actiniæ by Mr. Joseph Clubb. Two species of these Actinians possessed special brood-chambers, and the description of these forms a feature of considerable value in this Report, since the author, in addition to his own excellent work, has briefly summarized the labours of Verrill and Carlgren on the same subject.

The Report on the Botanical Collections occupies something less than two pages; but it would seem from the remarks of Mr. Gepp, in his account of the Musci, that some of the collections which have been recorded elsewhere as having been made on this expedition failed to reach the Museum.

The Report on the Rock-specimens is written by Mr. G. T. Prior. It is to be hoped that his surmise that "future exploration may possibly lead to the discovery of fossiliferous Mesozoic rocks" will be proved to be correct by the researches of the 'Discovery' expedition.

Not the least valuable part of this book is contained in the "Extracts from the Private Diary of the late Nicolai Hanson." These extracts have been rescued from oblivion by the efforts of Dr. Sharpe. Nicolai Hanson, it will be remembered, was the zoologist of the expedition, and was the only member thereof to succumb to the rigours and hardships inseparable from a sojourn in a region so inhospitable. Intended only for the perusal of his wife, this diary naturally contained merely references to such zoological facts as would be likely to interest one who was not a professed zoologist. His detailed and scientific observations were entered in a series of separate note-books which contained most precious information concerning the life-history of the creatures which came under his ken and of the specimens daily added by him and his assistant Mr. Evans to the collection. These note-books, we are told, "were handed to the commander of the expedition by the dying naturalist . . . . on the 14th of Oct., 1899." The only record we have of their contents are some observations from one of these books by the commander of the expedition; the rest have disappeared, and with them the fruits of the untiring labours of him whose zeal, as is shown by the diary to his wife, overtaxed his strength and ultimately brought about his death. The loss to zoological science of so gifted a naturalist is undoubtedly great, but it is rendered doubly great by the deplorable disappearance of these books, whereby he has been robbed of the reward of the labours which cost him his life and this Report has been materially impoverished.

## MISCELLANEOUS.

### *Note on the* Histeridæ (Ann. & Mag. Nat. Hist. 1902, vol. x. p. 273).

By G. Lewis, F.L.S.

Owing to a misprint in Scudder's list of genera I used the name of *Coptostethus* in establishing a new genus. The name was used in 1854 by Wollaston, so I wish to substitute *Coptotrophis* for *Coptostethus.*

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